

Common Gateway Services CSCI**Atlas Requirements Design****Checkout and Launch Control System (CLCS)****84K00700-001**Approval:

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NOTE: See "Supporting Document Note" on following page

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Supporting Document Note: Acronyms and definitions of many common CLCS terms may be found in the following documents: CLCS Acronyms 84K00240 and CLCS Project Glossary 84K00250.

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Table of Contents

1.	COMMON GATEWAY SERVICES CSCI	1-1
1.1	COMMON GATEWAY SERVICES CSCI INTRODUCTION	1-1
1.1.1	Common Gateway Services CSCI Overview.....	1-1
1.1.2	Common Gateway Services CSCI Operational Description.....	1-1
1.2	COMMON GATEWAY SERVICES COMPUTER SOFTWARE COMPONENTS (CSCs).....	1-4
2.	GATEWAY INITIALIZATION CSC.....	2-1
2.1	GATEWAY INITIALIZATION CSC INTRODUCTION	2-1
2.1.1	Gateway Initialization CSC Overview.....	2-1
2.1.2	Gateway Initialization CSC Operational Description.....	2-1
2.2	GATEWAY INITIALIZATION CSC SPECIFICATIONS.....	2-1
2.2.1	Gateway Initialization CSC Groundrules.....	2-1
2.2.2	Gateway Initialization CSC Functional Requirements	2-2
2.2.2.1	General Initialization.....	2-2
2.2.2.2	On-line state	2-2
2.2.2.3	Pre-Loaded state	2-2
2.2.2.4	Loaded state	2-3
2.2.2.5	Communicating state.....	2-3
2.2.2.6	Go state	2-3
2.2.2.7	Time board Initialization	2-4
2.2.3	Gateway Initialization CSC Performance Requirements.....	2-4
2.2.4	Gateway Initialization CSC Interfaces Data Flow Diagram	2-4
3.	GATEWAY COMMAND AND RESPONSE CSC	3-1
3.1	GATEWAY COMMAND AND RESPONSE CSC INTRODUCTION	3-1
3.1.1	Gateway Command and Response CSC Overview.....	3-1
3.1.2	Gateway Command and Response CSC Operational Description.....	3-1
3.2	GATEWAY COMMAND AND RESPONSE CSC SPECIFICATIONS	3-1
3.2.1	Gateway Command and Response CSC Groundrules	3-2
3.2.2	Gateway Command and Response CSC Functional Requirements	3-2
3.2.2.1	Gateway Processor Registration	3-2
3.2.2.2	Command Reception.....	3-2
3.2.2.3	Command Generation	3-3
3.2.2.4	Response Reception	3-3
3.2.2.5	Response Generation.....	3-3
3.2.2.6	Gateway Source Verification.....	3-3
3.2.3	Gateway Command and Response CSC Performance Requirements.....	3-4
3.2.4	Gateway Command and Response CSC Interfaces Data Flow Diagram	3-4
4.	GATEWAY RTCN SERVICES CSC.....	4-1
4.1	GATEWAY RTCN SERVICES CSC INTRODUCTION	4-1
4.1.1	Gateway RTCN Services CSC Overview	4-1
4.1.2	Gateway RTCN Services CSC Operational Description	4-1
4.2	GATEWAY RTCN SERVICES CSC SPECIFICATIONS.....	4-1
4.2.1	Gateway RTCN Services CSC Groundrules	4-1
4.2.2	Gateway RTCN Services CSC Functional Requirements	4-2
4.2.2.1	RTCN Interface Functions.....	4-2
4.2.2.2	Change Data Generation.....	4-2
4.2.3	Gateway RTCN Services CSC Performance Requirements	4-2
4.2.4	Gateway RTCN Services CSC Interfaces Data Flow Diagram.....	4-3
5.	GATEWAY SUBSYSTEM INTEGRITY CSC.....	5-1

5.1	GATEWAY SUBSYSTEM INTEGRITY CSC INTRODUCTION	5-1
5.1.1	Gateway Subsystem Integrity CSC Overview.....	5-1
5.1.2	Gateway Subsystem Integrity CSC Operational Description.....	5-1
5.2	GATEWAY SUBSYSTEM INTEGRITY CSC SPECIFICATIONS	5-1
5.2.1	Gateway Subsystem Integrity CSC Groundrules.....	5-1
5.2.2	Gateway Subsystem Integrity CSC Functional Requirements.....	5-2
5.2.2.1	Gateway Task Health and Status.....	5-2
5.2.2.2	Cyclic Health and System Status Function Designators	5-2
5.2.2.3	Gateway Processor Integrity	5-2
5.2.2.4	Gateway Redundancy Management	5-3
5.2.2.5	Gateway System Event Codes	5-3
5.2.2.6	Gateway Fatal Error Monitor Task	5-3
5.2.3	Gateway Subsystem Integrity CSC Performance Requirements.....	5-3
5.2.4	Gateway Subsystem Integrity CSC Interfaces Data Flow Diagram.....	5-3
6.	GATEWAY UTILITY SERVICES CSC	6-1
6.1	GATEWAY UTILITY SERVICES CSC INTRODUCTION.....	6-1
6.1.1	Gateway Utility Services CSC Overview	6-1
6.1.2	Gateway Utility Services CSC Operational Description	6-1
6.2	GATEWAY UTILITY SERVICES CSC SPECIFICATIONS	6-1
6.2.1	Gateway Utility Services CSC Groundrules	6-2
6.2.2	Gateway Utility Services CSC Functional Requirements	6-2
6.2.2.1	Error/Status Logging	6-2
6.2.2.2	System Messages	6-2
6.2.2.3	Block Logging	6-2
6.2.2.4	Recovery Dump	6-3
6.2.2.5	External Interfaces	6-3
6.2.2.6	Gateway Local Media	6-3
6.2.2.7	Gateway Message Database	6-3
6.2.3	Gateway Utility Services CSC Performance Requirements	6-4
6.2.4	Gateway Utility Services CSC Interfaces Data Flow Diagram.....	6-4
7.	GATEWAY GCP SERVICES CSC	7-1
7.1	GATEWAY GCP SERVICES CSC INTRODUCTION.....	7-1
7.1.1	Gateway GCP Services CSC Overview	7-1
7.1.2	Gateway GCP Services CSC Operational Description	7-1
7.2	GATEWAY GCP SERVICES CSC SPECIFICATIONS	7-1
7.2.1	Gateway GCP Services CSC Groundrules	7-1
7.2.2	Gateway GCP Services CSC Functional Requirements	7-1
7.2.3	Gateway GCP Services CSC Interfaces Data Flow Diagram.....	7-2
8.	GATEWAY FEPC SERVICES CSC.....	8-1
8.1	GATEWAY FEPC SERVICES CSC INTRODUCTION	8-1
8.1.1	Gateway FEPC Services CSC Overview	8-1
8.1.2	Gateway FEPC Services CSC Operational Description	8-1
8.2	GATEWAY FEPC SERVICES CSC SPECIFICATIONS.....	8-2
8.2.1	Gateway FEPC Services CSC Groundrules	8-2
8.2.2	Gateway FEPC Services CSC Functional Requirements	8-2
8.2.2.1	Common Initialization.....	8-2
8.2.2.2	Common Command Processor.....	8-2
8.2.2.3	Common Measurement Processor.....	8-2
8.2.3	Gateway FEPC Services CSC Performance Requirements	8-4
8.2.4	Gateway FEPC Services CSC Interfaces Data Flow Diagram.....	8-5
9.	GATEWAY MAINTENANCE USER INTERFACE CSC	9-1
9.1	GATEWAY MAINTENANCE USER INTERFACE CSC INTRODUCTION	9-1

9.1.1	<i>Gateway Maintenance User Interface CSC Overview.....</i>	<i>9-1</i>
9.1.2	<i>Gateway Maintenance User Interface CSC Operational Description.....</i>	<i>9-1</i>
9.2	GATEWAY MAINTENANCE USER INTERFACE CSC SPECIFICATIONS.....	9-1
9.2.1	<i>Gateway Maintenance User Interface CSC Groundrules.....</i>	<i>9-1</i>
9.2.2	<i>Gateway Maintenance User Interface CSC Functional Requirements.....</i>	<i>9-2</i>
9.2.2.1	Initialization	9-2
9.2.2.2	Command and Response	9-2
9.2.2.3	RTCN Services.....	9-2
9.2.2.4	Timer Services.....	9-2
9.2.2.5	Subsystem Integrity.....	9-2
9.2.2.6	Utility Services	9-3
9.2.3	<i>Gateway Maintenance User Interface CSC Performance Requirements.....</i>	<i>9-3</i>
9.2.4	<i>Gateway Maintenance User Interface CSC Interfaces Data Flow Diagram</i>	<i>9-4</i>
10.	GATEWAY INTEGRATED TEST ENVIRONMENT CSC	10-1
10.1	GATEWAY INTEGRATED TEST ENVIRONMENT CSC INTRODUCTION.....	10-1
10.1.1	<i>Gateway Integrated Test Environment CSC Overview.....</i>	<i>10-1</i>
10.1.2	<i>Gateway Integrated Test Environment CSC Operational Description.....</i>	<i>10-1</i>
10.2	GATEWAY INTEGRATED TEST ENVIRONMENT CSC SPECIFICATIONS.....	10-1
10.2.1	<i>Gateway Integrated Test Environment CSC Groundrules.....</i>	<i>10-1</i>
10.2.2	<i>Gateway Integrated Test Environment CSC Functional Requirements.....</i>	<i>10-2</i>
10.2.2.1	GITE Initialization and Commanding	10-2
10.2.2.2	GITE RTCN Analyzer.....	10-2
10.2.2.3	Function Designator Tracking Tool	10-2
10.2.2.4	LDB Applications Interface.....	10-3
10.2.3	<i>Gateway Integrated Test Environment CSC Performance Requirements.....</i>	<i>10-3</i>
10.2.4	<i>Gateway Integrated Test Environment CSC Interfaces Data Flow Diagram</i>	<i>10-3</i>

COMMON GATEWAY SERVICES CSCI

ATLAS REQUIREMENTS DESIGN

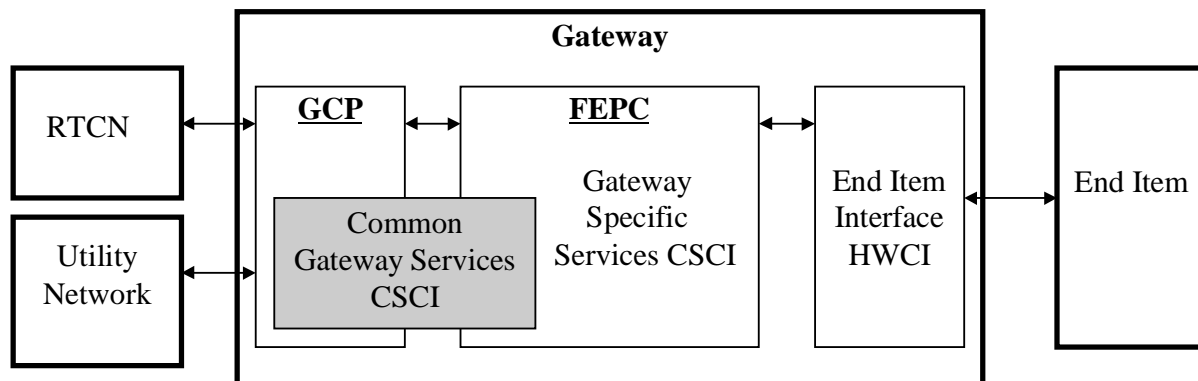
CHECKOUT AND LAUNCH CONTROL SYSTEM (CLCS)

1. COMMON GATEWAY SERVICES CSCI

1.1 COMMON GATEWAY SERVICES CSCI INTRODUCTION

1.1.1 Common Gateway Services CSCI Overview

The Common Gateway Services CSCI provides the Gateway functions that are common among all Gateway types. It is software resident on both the Gateway Control Processor (GCP) and the Front End Process Controller (FEPC). The Common Gateway Services CSCI's primary services are to provide and manage network interfaces for the Gateway, to provide common command routing and processing functions, and to provide Gateway-wide subsystem integrity.



1.1.2 Common Gateway Services CSCI Operational Description

The Common Gateway Services CSCI is initiated by the Real Time Operating System (RTOS) resident on the Gateway's local disk. Initially it will spawn all the necessary tasks to support the Gateway's internal services. All network interfaces for the Gateway are also provided by the Common Gateway Services CSCI.

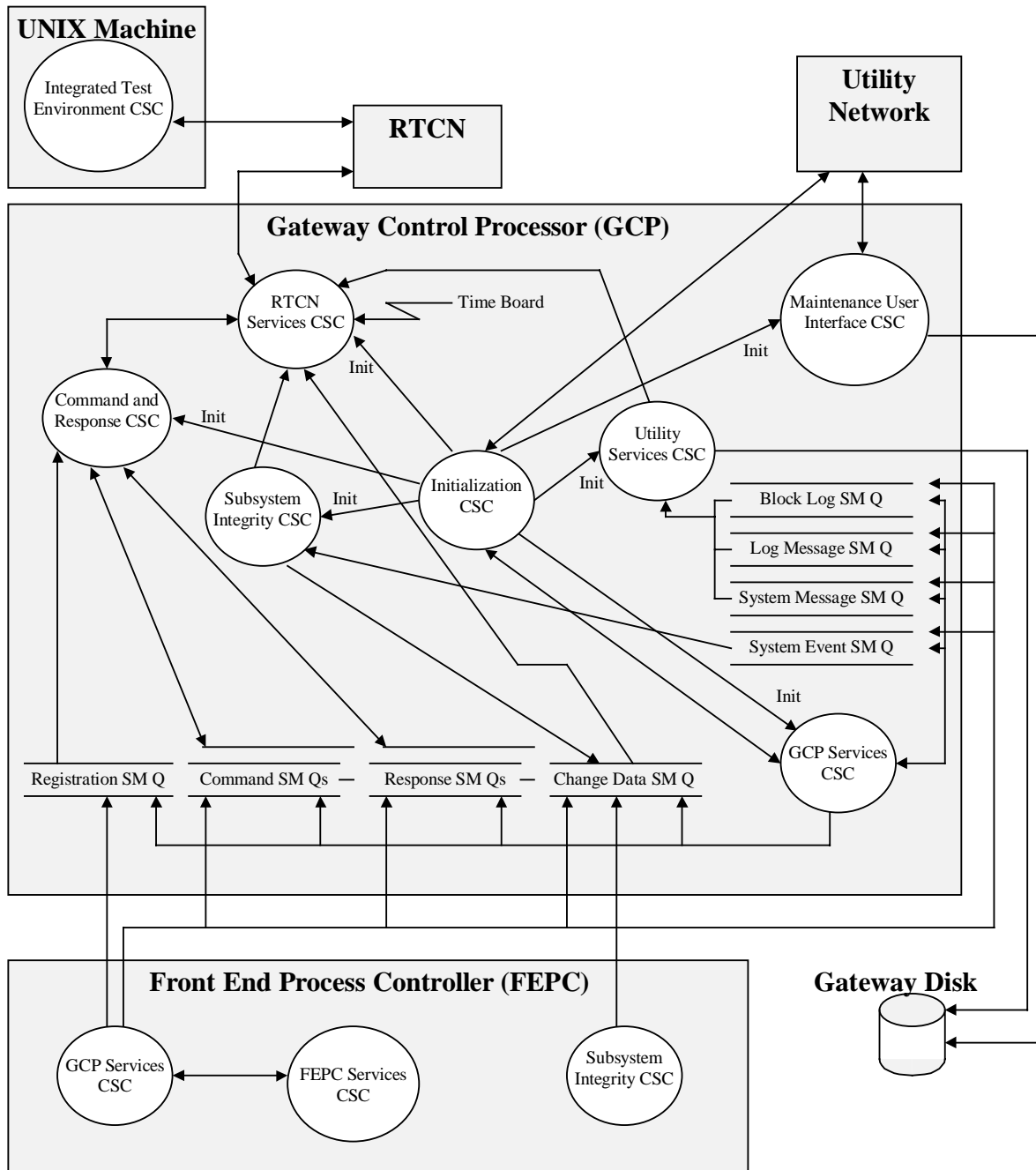
The Gateway Initialization CSC is responsible for stepping through the Gateway's initialization sequence. This CSC controls the System States of the Gateway from power up to an Operational state. As the initialization progresses, the Gateway Initialization CSC is also responsible for initiating the other Common Gateway Services CSCs at the appropriate time. Each Gateway-resident processor registers for Common Gateway Services using the Registration shared memory message queue. The Gateway FEPC Services CSC contains a generic set of initialization routines, and command and measurement processing routines which are applicable across unique FEPC types. These routines automate the initialization and command and measurement processing functions. The Gateway Initialization CSC also registers the initialization parameters for the GCP.

All Commands incoming to the Gateway are received asynchronously over the RTCN using the Gateway RTCN Services CSC. Commands are passed to the Gateway Command and Response CSC and then forwarded to the correct Gateway processor via the Command shared memory message queues. The Gateway resident processors read the commands out of the queues using the Gateway GCP Services CSC. The Gateway resident processor may also generate responses to the issuers of the commands using the Gateway GCP Services CSC. This places the outgoing response in

the response queues where it will be read by the Gateway Command and Response CSC and forwarded to the Gateway RTCN Services CSC for transmission over the RTCN.

Change Data is generated by the Gateway resident processor and is placed on the Change Data queues using the Gateway GCP Services CSC. The Gateway RTCN Services CSC is then responsible for reading Change Data entries off the queue, building a Change Data packet, and sending it over the RTCN at the System Synchronous Rate. The System Synchronous Rate will be provided as a software interrupt by the Gateway's local time board.

Gateway Health and Status will be accomplished by the Gateway Subsystem Integrity CSC. This CSC is responsible for task monitoring, and tracking processor health counts. All health and status information is transmitted as Function Designator entries in Change Data packets. The Change Data path of communication described above is used as the medium of their transmission. The Gateway Subsystem Integrity CSC is also responsible for the processing and generation of System Event codes.



The Gateway Utility Services CSC provides several generic capabilities to all resources in the Gateway. Error/message logging, Block Logging, and System Messages services are provided. This CSC also contains a Recovery Dump facility which will log all task, variable, and system information to the Shuttle Data Center and the Gateway disk if a fatal error occurs in the Gateway. The Gateway Utility Services CSC also provides a developmental means of storing a detailed error database for deciphering errors and other messages that may come to light in an operational environment. This database will be accessible using the Gateway Maintenance User Interface CSC.

The Maintenance User Interface CSC provides a network server for access to the Gateway over the Utility Network. This interface provides extensive CSC monitoring and Gateway Disk inspection capabilities. The capabilities to access verbose error messages, and decode Recovery Dumps are all accomplished by this Interface. It also provides limited internal commanding capabilities.

The Gateway Integrated Test Environment CSC provides a means of emulating the CCP, DDP, and Ops CM server. It operates over the RTCN on any machine that is not a Gateway. Command and Control and System Control commands may be sent using this CSC. It also provides an RTCN Analyzer that dumps information on a specific RTCN data stream.

1.2 COMMON GATEWAY SERVICES COMPUTER SOFTWARE COMPONENTS (CSCS)

Common Gateway Services CSCI is composed of the following CSCs:

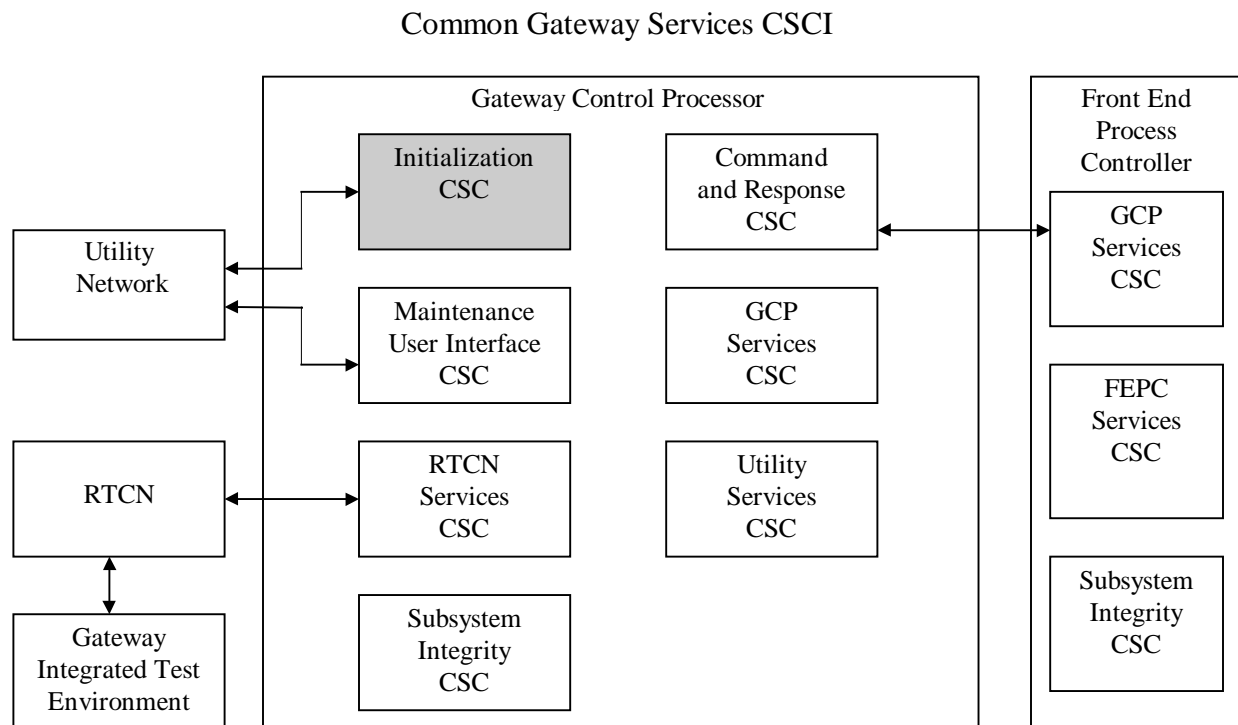
- Gateway Initialization CSC
- Gateway Command and Response CSC
- Gateway RTCN Services CSC
- Gateway Subsystem Integrity CSC
- Gateway Utility Services CSC
- Gateway GCP Services CSC
- Gateway FEPC Services CSC
- Gateway Maintenance User Interface CSC
- Gateway Integrated Test Environment CSC

2. GATEWAY INITIALIZATION CSC

2.1 GATEWAY INITIALIZATION CSC INTRODUCTION

2.1.1 Gateway Initialization CSC Overview

The Gateway Initialization CSC is responsible for the initialization sequence of the Gateway, and for the initialization and termination of all other Gateway CSCs. It is part of the Common Gateway Services CSCI and is resident in the GCP.



2.1.2 Gateway Initialization CSC Operational Description

The Gateway Initialization CSC controls the initialization sequence of the Gateway. The Gateway's initialization sequence follows the sequence of System States that applies to all Subsystems. Gateway Initialization CSC also manages the synchronized boot sequence between all the Single Board Computers resident in the Gateway.

2.2 GATEWAY INITIALIZATION CSC SPECIFICATIONS

2.2.1 Gateway Initialization CSC Groundrules

- SCID and TCID tables will be resident on the local hard drive.
- There will be only one Gateway Platform Configuration Identifier (PCID) which will include the VxWorks kernels for each Gateway processor.
- The Gateway Initialization CSC will support the following System States in order to synchronize the Gateway's boot sequence:
 - Out of Service

- Online
- Pre-Loaded
- Loaded
- Communicating
- Go

2.2.2 Gateway Initialization CSC Functional Requirements

The Functional Requirements for the Gateway Initialization CSC are arranged in the following major functions:

1. General Initialization
2. Online state
3. Pre-Loaded state
4. Loaded state
5. Communicating state
6. Go state
7. Time board Initialization

2.2.2.1 General Initialization

This section refers to requirements that are global across the Gateway Initialization CSC.

1. The Gateway Initialization CSC shall support communications (and FTP) over the Utility Network.
2. The Gateway Initialization CSC shall support access to the Gateway's Local Media.
3. The Gateway Initialization CSC shall record all Initialization messages on the Gateway's Local Media.
4. The Gateway Initialization CSC shall generate a System Message upon the successful or unsuccessful completion of an Activation command.
5. The Gateway Initialization CSC shall generate a System Message upon the successful or unsuccessful completion of a Termination command.

2.2.2.2 On-line state

The On-line state offers the most basic VxWorks operating system services. The Gateway will transition to the On-line state after the Gateway has powered on and the Gateway's PCID is loaded and is running. On the Gateway a small subset of the SCID will also be running in the On-line state.

1. The Gateway Initialization CSC shall transmit a message announcing the Gateway's state after transitioning to the On-line state. This message will be re-transmitted cyclically until an acknowledgment of the transmission is received.
2. The Gateway Initialization CSC shall be capable of Rebooting the Gateway from the On-line state.
3. The Gateway Initialization CSC shall be capable of Verifying a downloaded TCID in the On-line state.
4. *The Gateway Initialization CSC shall support the capability to perform an Operational Readiness Test (ORT) in the On-line state (Post-Atlas).*
5. *The Gateway Initialization CSC shall support the Power-Fail flag check in Non-volatile RAM before proceeding with Gateway Initialization (Post-Atlas).* This check will verify that the Gateway was terminated gracefully.
6. The Gateway Initialization CSC shall transition the Gateway to the Pre-Loaded state upon successful Verification of a downloaded TCID.

2.2.2.3 Pre-Loaded state

The Pre-Loaded state is the point at which a TCID has been downloaded and verified, but not yet Initialized.

1. The Gateway Initialization CSC shall be capable of Rebooting the Gateway from the Pre-Loaded state.
2. The Gateway Initialization CSC shall be capable of Verifying a downloaded TCID in the Pre-Loaded state.

3. The Gateway Initialization CSC shall be capable of Initializing the downloaded TCID in the Pre-Loaded state. This will involve Initializing the SCID, Starting all Gateway CSCs, Loading the downloaded TCID, and acquiring a copy of the System Configuration Table.
4. The Gateway Initialization CSC shall transition to Loaded state upon a successful Load and Initialization of the System Configuration Table.

2.2.2.4 Loaded state

The Loaded state represents the point at which the Gateway is able to communicate over the RTCN. The SCID and TCID are both initialized and running.

1. The Gateway Initialization CSC shall generate a System Event Code upon successful transition to the Loaded state.
2. The Gateway Initialization CSC shall verify the Gateway's Loaded state in the System Configuration Table before proceeding with Gateway initialization.
3. The Gateway Initialization CSC shall be capable of Rebooting the Gateway from the Loaded state.
4. *The Gateway Initialization CSC shall support the capability to perform an Operational Readiness Test (ORT) in the Loaded state (Post-Atlas).*
5. The Gateway Initialization CSC shall support the capability to Restart the Gateway (from Checkpointed tables) in the Loaded state.
6. The Gateway Initialization CSC shall be capable of Activating the Gateway. Gateway Activation involves the start of Change Data and Health count generation, and the capability to respond to Commands.
7. The Gateway Initialization CSC shall be capable of Terminating the Gateway from the Loaded state. This will cause the Gateway to transition to the On-line state. All resources and memory allocated to transition the Gateway to the Loaded state will be freed during Termination.
8. The Gateway Initialization CSC shall transition to the Communicating state upon successful completion of Gateway Activation.

2.2.2.5 Communicating state

The Communicating state is the point at which the Gateway's health and activities are visible and tracked by the entire System.

1. The Gateway Initialization CSC shall verify the Gateway's Communicating state in the System Configuration Table before proceeding with Gateway initialization.
2. The Gateway Initialization CSC shall support the capability to perform a Checkpoint of loaded TCID tables in the Communicating state.
3. The Gateway Initialization CSC shall support the capability to accept RTCN Commands in the Communicating state.
4. The Gateway Initialization CSC shall support the capability to perform a Switchover in the Go state.
5. *The Gateway Initialization CSC shall support the capability to perform an Operational Readiness Test (ORT) in the Communicating state (Post-Atlas)*
6. The Gateway Initialization CSC shall be capable of Terminating the Gateway from the Communicating state. This will cause the Gateway to transition to the (TBD) state. All resources and memory allocated to transition the Gateway to the Communicating state will be freed during Termination.

2.2.2.6 Go state

The Go state is the point at which the Gateway is considered Operational.

1. The Gateway Initialization CSC shall support the capability to accept all RTCN commands in the Go state.
2. The Gateway Initialization CSC shall support the capability to perform a Checkpoint of loaded TCID tables in the Go state.
3. The Gateway Initialization CSC shall support the capability to perform a Switchover in the Go state.
4. *The Gateway Initialization CSC shall support the capability to perform an Operational Readiness Test (ORT) in the Go state (Post-Atlas).*

5. The Gateway Initialization CSC shall be capable of Terminating the Gateway from the Go state. This is considered a fatal error on the Gateway and will cause the Gateway to transition to the (TBD) state.

2.2.2.7 Time board Initialization

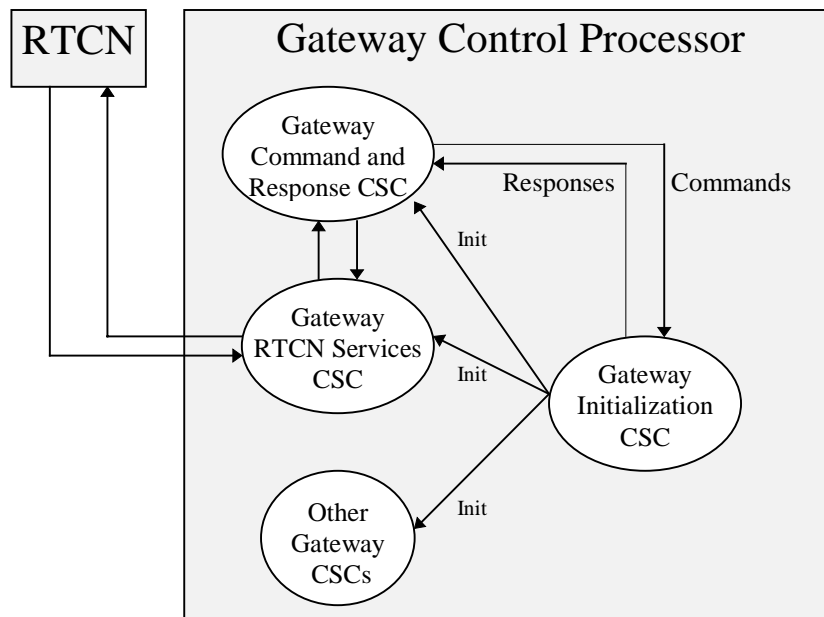
Resident in the Gateway is a time board which is referenced throughout processing for accurate time. The Time board must be configured during Initialization to insure that time is accurate when the Gateway is operational.

1. The Gateway Initialization CSC shall be capable of initializing the Time board during SCID Initialization.
2. The Gateway Initialization CSC shall be capable of configuring the Time board to use the external IRIG-B signal (if available) in order to synchronize the time of day.
3. The Gateway Initialization CSC shall program the Time board to interrupt the Gateway Control Processor at the System Synchronous Rate when the Gateway is in the Communicating or Go states.

2.2.3 Gateway Initialization CSC Performance Requirements

No performance requirements have been identified for the Gateway Initialization CSC for the Thor delivery.

2.2.4 Gateway Initialization CSC Interfaces Data Flow Diagram



Gateway Initialization CSC is the first CSC to be spawned by the Gateway. It is responsible for the creation and termination of all other Gateway CSCs.

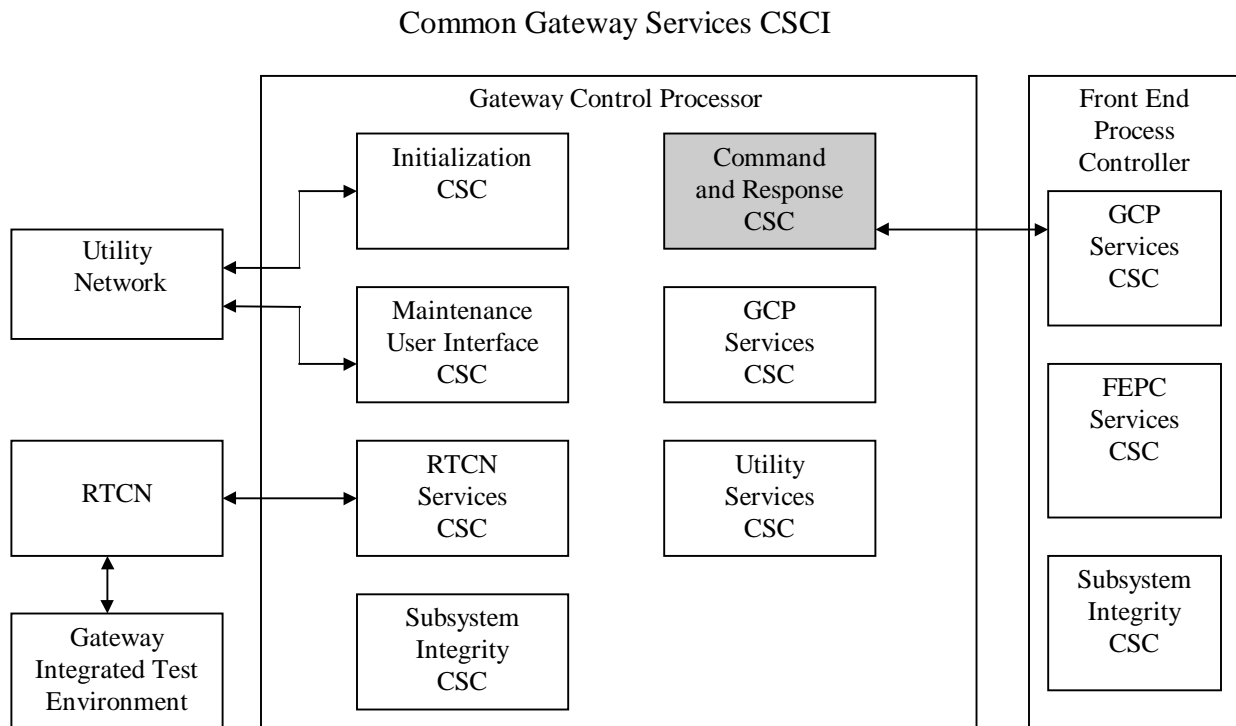
Gateway Initialization CSC commands and responses are handled through the Gateway Command and Response CSC.

3. GATEWAY COMMAND AND RESPONSE CSC

3.1 GATEWAY COMMAND AND RESPONSE CSC INTRODUCTION

3.1.1 Gateway Command and Response CSC Overview

The Gateway Command and Response CSC is responsible for handling the routing, verification, and processing of all commands and responses in the Gateway.



3.1.2 Gateway Command and Response CSC Operational Description

The Gateway Command and Response CSC handles command registration, and command and response processing. During Gateway initialization, each Gateway resident processor registers the Route Code and Request IDs it expects during processing. All shared memory message queues, a routing table, and a transaction table are built using the registered information.

An incoming RTCN command is indexed into the routing table by its Route Code and Request ID, stored in the transaction table if a response is required, checked for command priority, and relayed to the appropriate Gateway processor(s) command queues. A Gateway resident processor's generated response is indexed into the transaction table by transaction ID to verify a response was expected, and relayed to the RTCN.

The Gateway Command and Response CSC is also capable of relaying to the RTCN any commands issued by the Gateway resident processors, and handling the incoming responses associated with those commands.

3.2 GATEWAY COMMAND AND RESPONSE CSC SPECIFICATIONS

3.2.1 Gateway Command and Response CSC Groundrules

- Gateway Command and Response CSC will use the Gateway RTCN Services CSC for all accesses to/from the RTCN.
- Route Code 0 will be reserved for internal Gateway communications. No command with a Route Code of 0 will reach a network.
- Communication to other Gateway-resident processors will be by shared memory message queues. The Gateway-resident processors will interface to these queues using functions provided by the Gateway GCP Services CSC.
- The Gateway Command and Response CSC will use the System Configuration Table (SCT) to derive the Logical CPU IDs used for sending/receiving commands, and to build the list of valid command sources for the Gateway.

3.2.2 Gateway Command and Response CSC Functional Requirements

The Functional Requirements for Gateway Command and Response CSC are arranged in the following major/minor functions:

1. Gateway Processor Registration
2. Command Reception
3. Command Generation
4. Response Reception
5. Response Generation
6. Gateway Source Verification

3.2.2.1 Gateway Processor Registration

Gateway Processor Registration is the means by which Gateway-resident processors are able to register for Common Gateway Services capabilities.

1. Gateway Command and Response CSC shall provide a means for all Gateway-resident processors to register for Common Gateway Services.
2. Gateway Command and Response CSC shall provide the following services to each registered Gateway-resident processor:
 - 2.1. Command Registration
 - 2.2. Normal and High Priority Command Generation
 - 2.3. Normal and High Priority Command Reception
 - 2.4. Command Response Generation
 - 2.5. Command Response Reception
3. Gateway Command and Response CSC shall be responsible for routing Received Commands to the appropriate Gateway-resident processor.
4. Gateway Command and Response CSC shall be responsible for managing and tracking all Gateway transactions during processing. A transaction is defined as a Command/Response generated or received by the Gateway.
5. Gateway Command and Response CSC shall be responsible for reporting all outstanding Gateway transactions that have timed out during processing.

3.2.2.2 Command Reception

Gateway Command Reception is the routing and processing of incoming RTCN commands.

1. Gateway Command and Response CSC shall provide the capability to receive Commands asynchronously from the RTCN.
2. Gateway Command and Response CSC shall perform Source Verification on all Received Commands (See 3.2.2.6)
3. All Received Commands shall index the Route Table for propagation to the correct Gateway-resident processor
4. All Received Commands that have been designated in the command header as High Priority shall be placed in the appropriate Gateway-resident processor's High Priority Receive Command queue.

5. All Received Commands shall be registered as outstanding Gateway transactions.

3.2.2.3 Command Generation

Gateway Command Generation is the processing and generation of outgoing Gateway commands.

1. Gateway Command and Response CSC shall provide the capability to generate Commands over the RTCN.
2. Gateway Command and Response CSC shall receive Command Generation requests from the Gateway-resident processor(s) asynchronously from the Command Generation shared memory message queues.
3. All Command Generation requests in the High Priority Command Generation queue shall be processed before any requests from the Normal Priority Command Generation queue are processed.
4. Command Generation requests that expect a Command Response shall be registered as outstanding Gateway transactions.

3.2.2.4 Response Reception

Gateway Response Reception is the processing of incoming responses to Gateway commands.

1. Gateway Command and Response CSC shall provide the capability to receive Command Responses asynchronously from the RTCN.
2. Received Command Responses shall be verified as expected by referencing the Gateway's outstanding transactions.
3. A Received Command Response that satisfies an outstanding transaction shall cause that transaction to be cancelled.
4. Gateway Command and Response CSC shall support the Command Issued completion code for generated Commands that require extra time to process.
5. A Received Command Response that does not satisfy an outstanding transaction shall cause an Unsolicited Response System Message to be issued.
6. Received Command Responses shall be routed to the Gateway-resident processor that originated the command.

3.2.2.5 Response Generation

Gateway Response Generation is the building and generation of outgoing Responses to the commands processed by the Gateway.

1. Gateway Command and Response CSC shall provide the capability to Generate Command Responses over the RTCN using the API provided by the Network Services CSC
2. Gateway Command and Response CSC shall receive Command Responses generated by the Gateway-resident processor(s) asynchronously from the Response Generation shared memory message queue.
3. A Command Response that is read from the Response Generation, but does not satisfy an outstanding transaction shall cause the generation of an Unsolicited Response System Message.
4. A Command Response that is read from the Response Generation queue and satisfies an outstanding transaction shall cause that transaction to be removed, and shall be time-stamped and sent over the RTCN.
5. A Command Response that is one of several expected Responses shall be stored until all expected responses have been received by the Gateway Command and Response CSC. At that time the outstanding transaction shall be removed, and a single Command Response that is the concatenation of all expected responses shall be created, time-stamped, and sent over the RTCN.
6. Gateway Command and Response CSC shall support the Command Issued completion code for those commands that require extended periods of time to process.
7. All Command Responses generated by the Gateway shall be time-stamped immediately prior to transfer over the RTCN. The time stamp will reflect the time the response left the gateway, not when processing occurred.

3.2.2.6 Gateway Source Verification

Gateway Source Verification is responsible for verifying that the Source of a Command to the Gateway is valid.

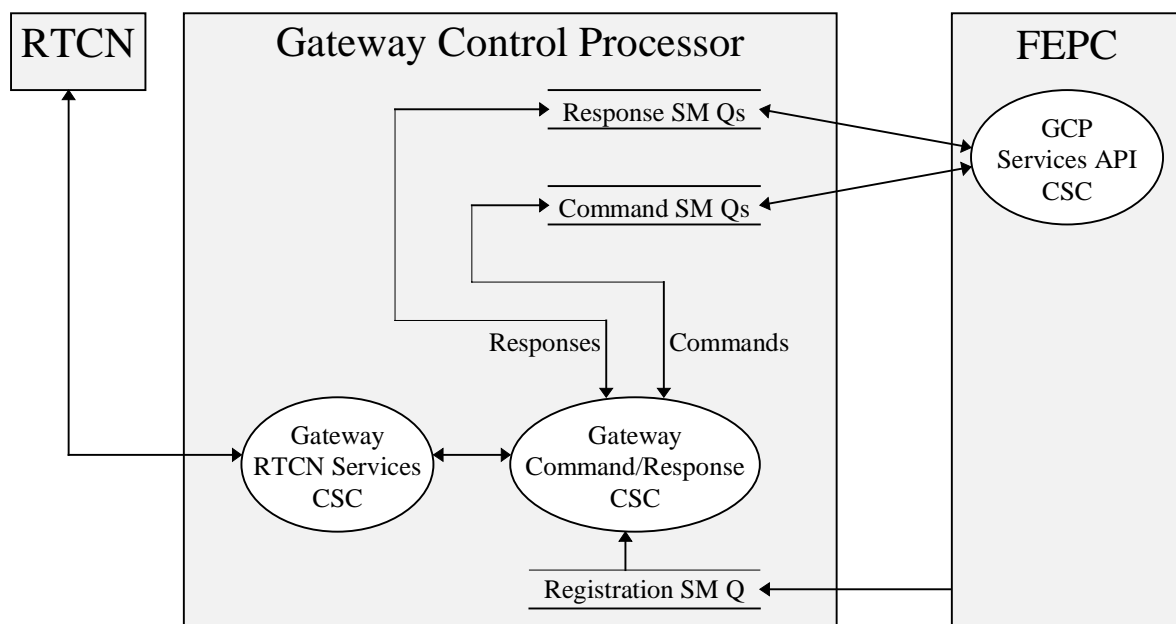
1. Gateway Command and Response CSC shall build a list of valid command sources. This list shall be derived from the SCT.

2. During the processing of a C-C Message, the Payload Type, Source CPU ID, and Destination CPU ID fields from the C-C Packet header will be verified to be correct and from a valid source.
3. During the processing of a Non C-C Message, the Payload Type, and Source CPU ID fields from the Non C-C Packet header will be verified to be correct and from a valid source.

3.2.3 Gateway Command and Response CSC Performance Requirements

1. Gateway Command and Response CSC shall be capable of processing 500 commands per second.
2. Internal Gateway timeouts shall be less than the Command and Control timeouts.

3.2.4 Gateway Command and Response CSC Interfaces Data Flow Diagram



All Gateway-resident processors register with the Gateway Command and Response CSC using the Registration shared memory message queue. Registration includes the Commands that a specific Gateway-resident processor is expecting.

Incoming RTCN Commands are received by the Gateway RTCN Services CSC, and forwarded to the Gateway Command and Response CSC. Command Sources are verified in the Gateway Command and Response CSC. Received Commands are routed to the Gateway-resident processor(s) that registered for the Commands. This is accomplished using the Command shared memory message queues. RTCN Responses generated by any Gateway-resident processor are read from the Response shared memory message queues by the Gateway Command and Response CSC. These are then forwarded to the RTCN using the Gateway RTCN Services CSC.

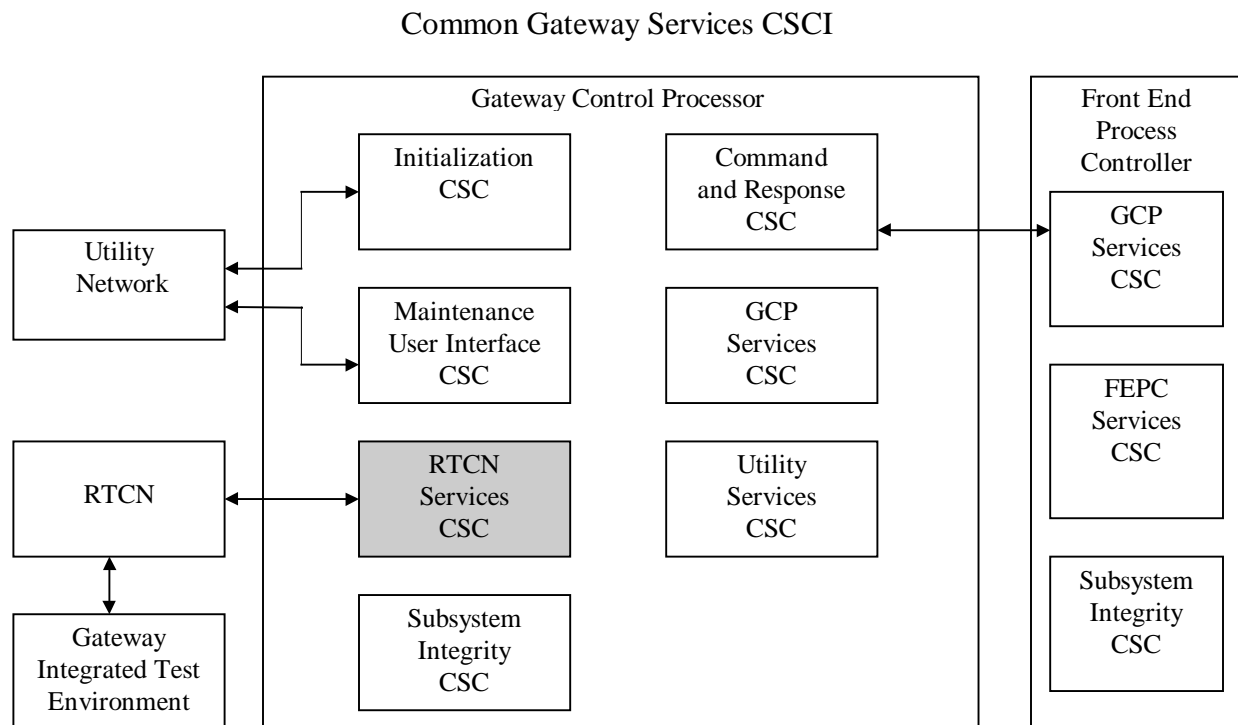
Commands generated by the Gateway resident processor are read from the Command shared memory message queues by the Gateway Command and Response CSC. These will be routed according to the Request ID of the internal command. Responses received from these commands are received through the Response shared memory message queues.

4. GATEWAY RTCN SERVICES CSC

4.1 GATEWAY RTCN SERVICES CSC INTRODUCTION

4.1.1 Gateway RTCN Services CSC Overview

The Gateway RTCN Services CSC is responsible for the different services needed by the Gateway when interfacing with the RTCN. It is also responsible for output of Change Data packets. It is part of the Common Gateway Services CSCI and is resident in the GCP.



4.1.2 Gateway RTCN Services CSC Operational Description

The Gateway RTCN Services CSC contains the API provided by the System Services CSCI which is used by the Gateway components when interfacing with the RTCN. Also, when interrupted by the Time board, the Gateway RTCN Services CSC will build RTCN change data packets and transfer them to the RTCN. These RTCN change data packets contain change measurements provided by the Gateway.

4.2 GATEWAY RTCN SERVICES CSC SPECIFICATIONS

4.2.1 Gateway RTCN Services CSC Groundrules

- The Network Services CSC API library will be used by the Gateway RTCN Services CSC for all communications over the RTCN.
- The Gateway Time board will synchronize the RTCN Services CSC to the System Synchronous Rate.
- All Gateway-resident processors will provide change measurements using the Change Data shared memory message queue.

4.2.2 Gateway RTCN Services CSC Functional Requirements

The Gateway RTCN Services CSC shall provide change data packets to the RTCN at the system synchronous rate.

The Functional Requirements for the Gateway RTCN Services CSC are arranged in the following major functions:

1. RTCN Interface Functions
2. Change Data Generation

4.2.2.1 RTCN Interface Functions

The RTCN Interface Functions use the Network Services CSCI API to aid other Gateway CSCs in the management of network data connections.

1. Gateway RTCN Services CSC shall provide functions to open and close, and send and receive on Gateway network data connections.
2. Gateway RTCN Services shall maintain a Network Connection Table to track the state and activity of each network data connection.

4.2.2.2 Change Data Generation

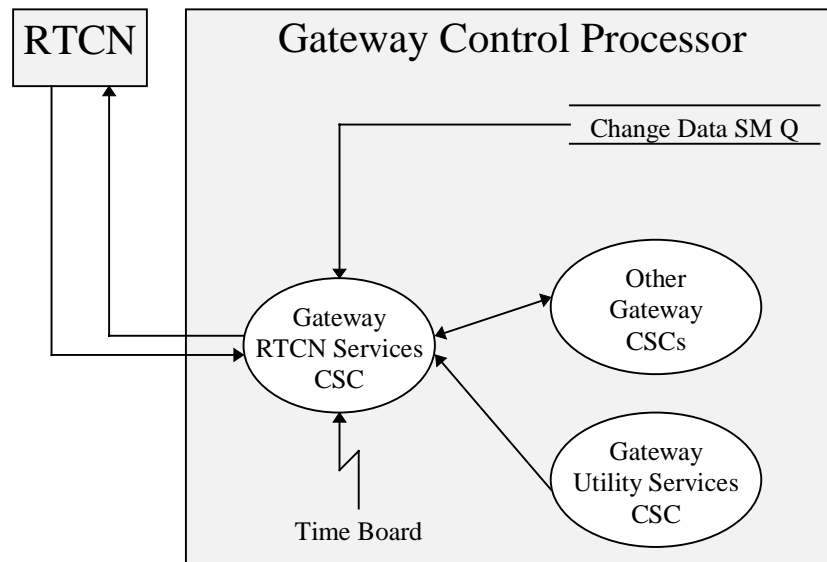
The Change Data Generation functions are responsible for the output of Change Data from the Gateway.

1. Gateway RTCN Services CSC shall receive Change Data entries asynchronously from the Change Data shared memory message queue.
2. Gateway RTCN Services CSC shall timestamp all received Change Data entries, and add them to the Gateway's outgoing Change Data packet.
3. When necessary, Gateway RTCN Services CSC shall include a millisecond offset time entry into the Change Data packet preceding the appropriate Change Data entry.
4. Gateway RTCN Services CSC shall transmit Change Data packets over the RTCN at the System Synchronous Rate.
5. Gateway RTCN Services CSC shall be capable of preventing specified Change Data entries from being included in the outgoing Change Data.(TBD)

4.2.3 Gateway RTCN Services CSC Performance Requirements

1. The Gateway RTCN Services CSC shall transmit Change Data packets over the RTCN at the System Synchronous Rate.
2. The Gateway RTCN Services CSC shall be capable of throttling the output of Change Data to a specified rate.(TBD)

4.2.4 Gateway RTCN Services CSC Interfaces Data Flow Diagram



Gateway RTCN Services CSC is spawned by the Gateway Initialization CSC.

All communications with the RTCN are handled by the Gateway RTCN Services CSC. Commands and Responses are channeled to the Gateway Command and Response CSC. System Messages and Block Logs that are generated by the Utility Services CSC are also handled.

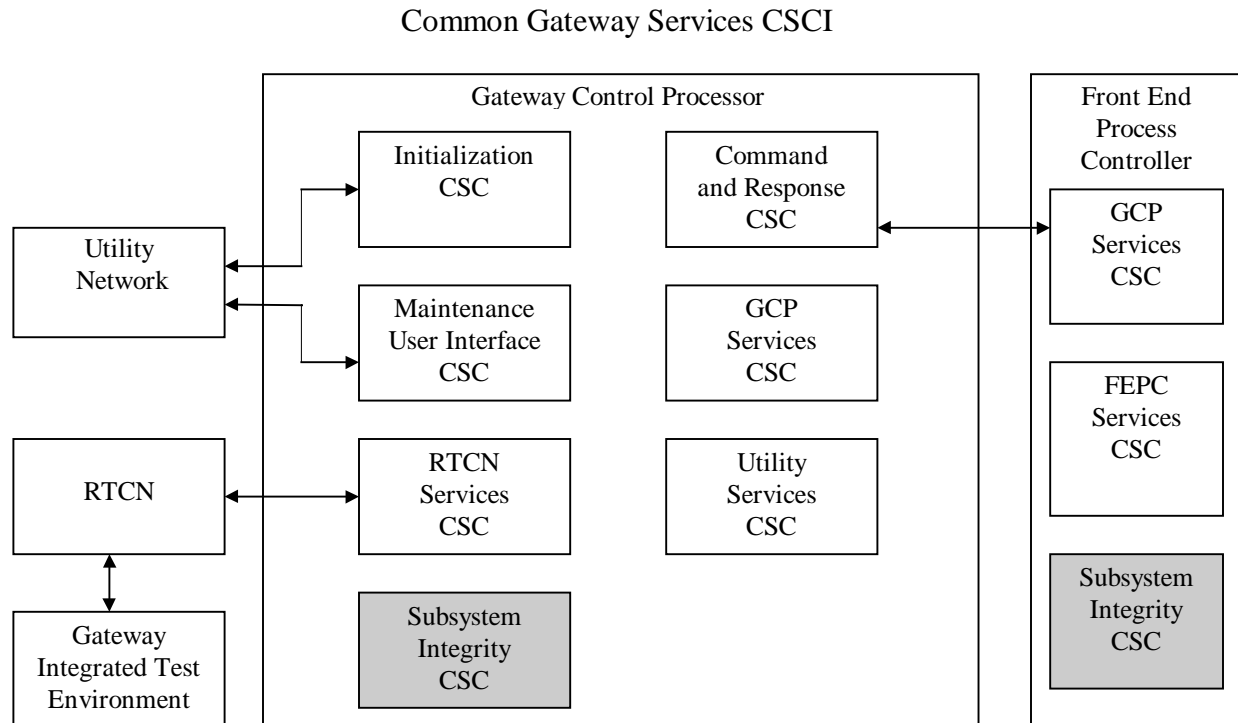
Change Data is read from the Change Data Shared memory Message Queue, stored in a packet and sent at the System Synchronous Rate. The System Synchronous Rate on the Gateway is synchronized by the Gateway Time board.

5. GATEWAY SUBSYSTEM INTEGRITY CSC

5.1 GATEWAY SUBSYSTEM INTEGRITY CSC INTRODUCTION

5.1.1 Gateway Subsystem Integrity CSC Overview

The Gateway Subsystem Integrity CSC is responsible for maintaining task and board level integrity in the Gateway.



5.1.2 Gateway Subsystem Integrity CSC Operational Description

The Gateway Subsystem Integrity CSC is a set of tasks and tables that monitor the health of all tasks in the Gateway. Also, this CSC builds and maintains a Shared Memory area through which each CPU in the Gateway may update Health and Status information. This information is tracked closely by the Gateway Control Processor (GCP). A mechanism is provided by this CSC to automatically report Health and Status FDs on a cyclic basis. This CSC is responsible for the generation and reception of System Event codes. Gateway Subsystem Integrity is also responsible for recovery/termination in the case of a Gateway Health problem.

5.2 GATEWAY SUBSYSTEM INTEGRITY CSC SPECIFICATIONS

5.2.1 Gateway Subsystem Integrity CSC Groundrules

- All Gateway Subsystem Integrity CSC Change Data will be included as part of the standard Gateway Change Data output stream.
- Gateway task monitoring will not apply to VxWorks Operating System tasks (possible in a future release).
- Every monitored task in the Gateway will be assumed a Non-critical task unless that task is explicitly declared as Critical.

- Test Build CSCI will provide each Gateway with tables correlating Subsystem Integrity FD Names to the FDIDs for each physical and logical Gateway.

5.2.2 Gateway Subsystem Integrity CSC Functional Requirements

The Functional Requirements for the Gateway Subsystem Integrity CSC are arranged in the following major functions:

1. Gateway Task Health and Status
2. Cyclic Health and Status Function Designators
3. Gateway Processor Integrity
4. Gateway Redundancy Management
5. System Event Codes
6. Gateway Fatal Error Monitor

5.2.2.1 Gateway Task Health and Status

Gateway Task Health and Status is a set of task monitoring functions that will reside on every processor in the Gateway.

1. Gateway Subsystem Integrity CSC shall be capable of tracking the health of all SCID tasks on each Gateway-resident processor.
2. Gateway Subsystem Integrity CSC shall verify the existence of all tracked tasks every (TBD) update rate period.
3. Gateway Subsystem Integrity CSC shall check the processing state of all tracked tasks every (TBD) update rate period.
4. A Critical task that is found to be absent or suspended shall cause Gateway Subsystem Integrity CSC to discontinue processing, attempt to send a System Event Code, attempt to send a System Message, and perform a Recovery.
5. A Non-critical task that is found to be absent or suspended shall cause Gateway Subsystem Integrity CSC to send a System Message.

5.2.2.2 Cyclic Health and System Status Function Designators

Cyclic Health and Status Function Designators are those FDs which require periodic updates. Gateway Subsystem Integrity CSC will provide a generic means of reporting these reliably.

1. Gateway Subsystem Integrity CSC shall provide the capability to register a Function Designator (FD) to be cyclically reported as Change Data at a specified rate.
2. Gateway Subsystem Integrity CSC shall maintain System Status Function Designator measurements.
3. Gateway Subsystem Integrity CSC shall provide the capability to output Cyclic Health and System Status FD information on demand.

5.2.2.3 Gateway Processor Integrity

Gateway Processor Integrity consists of a Task and Shared Memory Area residing on the Gateway Control Processor (GCP). The Shared Memory Area contains a Health counter for each processor in the Gateway. It is the responsibility of each Gateway resident processor to update its count in this Shared Memory Area, and to verify the counts of the other processors in the Gateway.

1. Gateway Subsystem Integrity CSC shall be responsible for tracking and reporting the Gateway-wide health counter.
2. Gateway Subsystem Integrity CSC shall be responsible for updating the Health counter for each Gateway-resident processor.
3. A Gateway-resident processor that fails to update its health counter shall cause the Gateway to discontinue processing, attempt to send a System Event Code, attempt to send a System Message, and perform Recovery.
4. All Gateway-resident processors successfully updating their health counters shall cause the Gateway Subsystem Integrity CSC to increment and transmit a Gateway-wide health counter at a (TBD) rate.

5.2.2.4 Gateway Redundancy Management

Gateway Redundancy Management is responsible for providing fault tolerance within the Gateway.

1. Gateway Subsystem Integrity CSC shall provide the capability to perform a switchover.
2. Each Gateway shall provide redundant network interfaces to the RTCN.

5.2.2.5 Gateway System Event Codes

The System Event routines provide all processes on the Gateway the ability to send and receive System Event codes.

1. Gateway Subsystem Integrity CSC shall provide an independent shared memory message queue and handling task for System Event processing.
2. Gateway Subsystem Integrity CSC shall provide a method for all resources in the Gateway to send System Event codes.
3. Gateway Subsystem Integrity CSC shall provide a method for each Gateway-resident processor to receive System Event codes.

5.2.2.6 Gateway Fatal Error Monitor Task

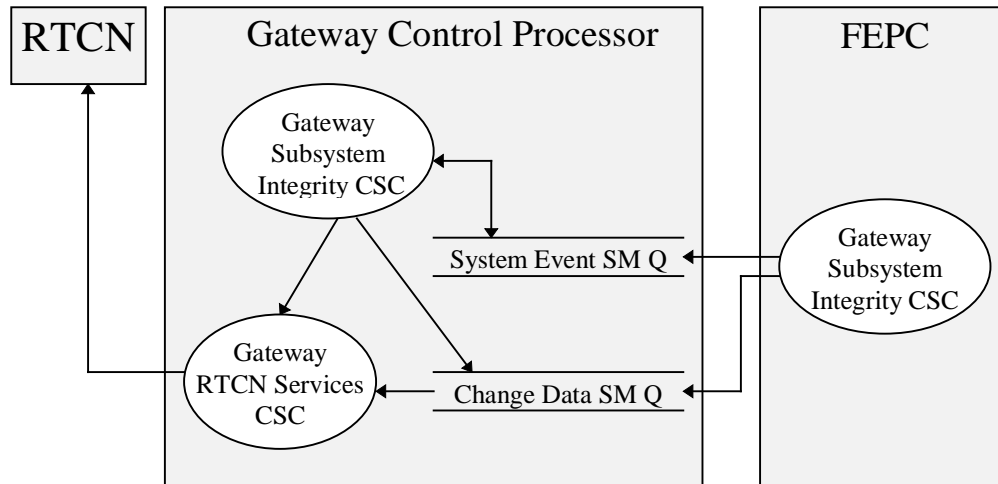
The Fatal Error Monitor Task will be present on all of the Gateway processors. It will provide the capability to shutdown the Gateway if a fatal error occurs.

1. Each Gateway-resident processor shall include a Gateway Fatal Error Monitor task.
2. The Gateway Fatal Error Monitor Task shall be the highest priority SCID task running.
3. The Gateway Fatal Error Monitor Task shall call a processor-specific shutdown function when a shutdown is required.
4. The Gateway Fatal Error Monitor Task shall be responsible for initiating the Gateway's Recovery Dump function.

5.2.3 Gateway Subsystem Integrity CSC Performance Requirements

1. Gateway Subsystem Integrity CSC shall transmit the Gateway-wide health counter at a (TBD) rate.
2. Gateway Subsystem Integrity CSC shall transmit Gateway System Status Change Data at a (TBD) rate).

5.2.4 Gateway Subsystem Integrity CSC Interfaces Data Flow Diagram



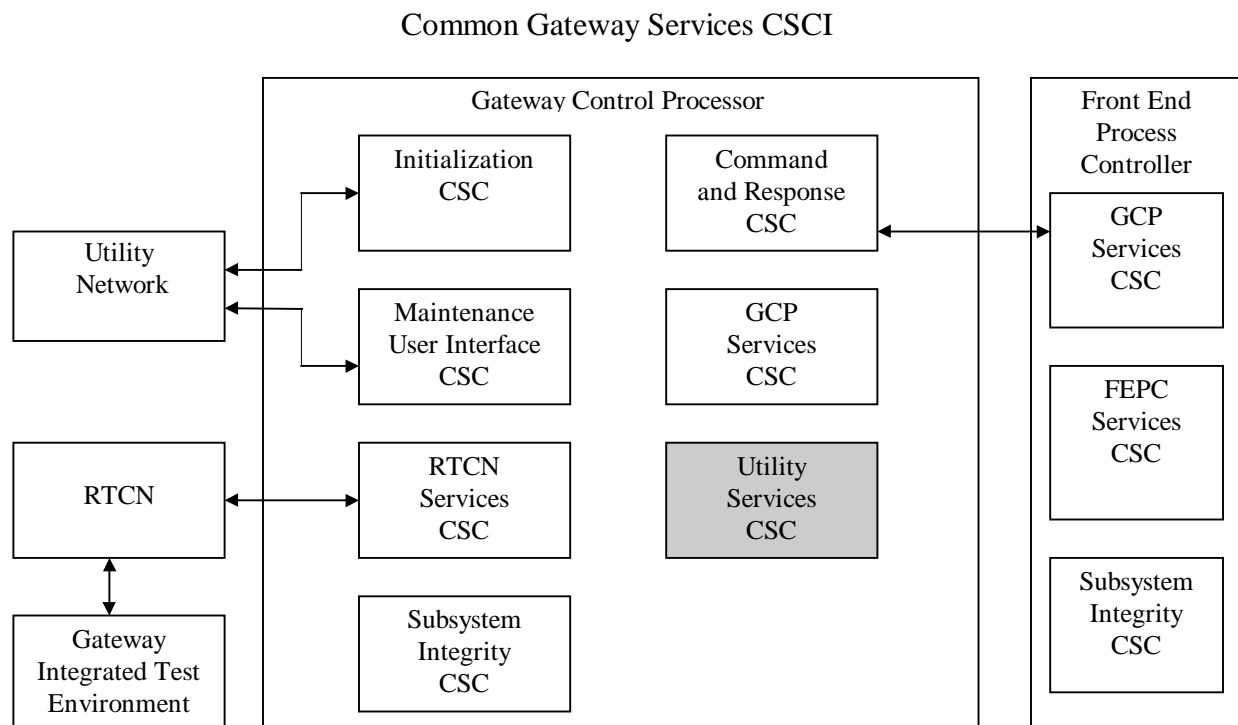
Gateway Subsystem Integrity CSC is spawned by the Gateway Initialization CSC. All Subsystem Integrity information is channeled through the Change Data Shared Memory Message Queue. From there, it is routed to the RTCN using the Gateway RTCN Services CSC.

6. GATEWAY UTILITY SERVICES CSC

6.1 GATEWAY UTILITY SERVICES CSC INTRODUCTION

6.1.1 Gateway Utility Services CSC Overview

The Gateway Utility Services CSC is responsible for transmitting System Messages, error logging and status logging. It is part of the Common Gateway Services CSCI and is resident in the GCP.



6.1.2 Gateway Utility Services CSC Operational Description

Gateway Utility Services CSC will provide the capability for any resource in the Gateway to generate System Messages and Block Logs via the RTCN. It will also provide the capability to log Error and Status messages to local disk. These error and status message can also be routed to the console port. Many metrics will be maintained by this CSC such as commands processed per second, etc. Gateway Utility Services also provides a Recovery Dump function which will dump all global and local variables to the disk.

The Gateway Utility Services detailed message database is intended as an informational tool to complement System Message reporting. By using this database, operations and maintenance engineers will have a reference for that information that does not necessarily warrant a System Message. Note throughout this document, though, that every System Message has a field for the associated Gateway Database Help ID. This will be an integer which can be used to index the database. The Gateway's detailed message database will be resident on the Gateway's local disk.

6.2 GATEWAY UTILITY SERVICES CSC SPECIFICATIONS

6.2.1 Gateway Utility Services CSC Groundrules

- The message number used to format System Messages will be defined in a header file that will be provided by the System Message Services CSC.
- The Gateway Maintenance User Interface CSC shall provide the means to access the detailed Gateway error descriptions provided by the Gateway Utility Services CSC.
- The Gateway Maintenance User Interface CSC shall provide the means to decode the local version of Recovery Dump provided by the Gateway Utility Services CSC.

6.2.2 Gateway Utility Services CSC Functional Requirements

The Functional Requirements for the Gateway Utility Services CSC are arranged in the following major functions:

1. Error/Status logging
2. System Messages
3. Block Logging
4. Recovery Dump
5. External Interfaces
6. Gateway Local Media
7. Gateway Error Database

6.2.2.1 Error/Status Logging

The Logging routines provide all processes on the Gateway the ability to log messages to the console port and/or the disk. Also, a means to register detailed descriptions of errors will be provided.

1. Gateway Utility Services CSC shall provide a method for all resources on the Gateway to Log Error/Status messages to the Gateway disk and/or the console port.
2. Gateway Utility Services CSC shall provide an independent shared memory message queue and handling task for Log Message processing.

6.2.2.2 System Messages

The System Message routines provide all processes on the Gateway the ability to send a System Message.

1. Gateway Utility Services CSC shall provide a method for all resources on the Gateway to send a System Message.
2. Gateway Utility Services CSC shall provide an independent message queue and handling task for the processing and generation of System Messages.
3. Gateway System Messages shall be written to the Log File if transmission over the RTCN is unsuccessful.

6.2.2.3 Block Logging

Block Logs are the Gateway's method of archiving data to the Shuttle Data Center (SDC).

1. Gateway Utility Services CSC shall provide the means for any Gateway resource to Block Log a message to SDC.
2. Gateway Utility Services CSC shall provide an independent shared memory queue and handling task for Block Log processing.
3. Gateway Block Logs shall be recorded to the Gateway's local storage media if their transmission over the RTCN is unsuccessful.
4. Gateway Block Logs shall have a maximum size of 8 Kbytes per transmission.

6.2.2.4 Recovery Dump

A Recovery Dump occurs when a fatal error has been encountered on the Gateway. It is a means of dumping raw Gateway information before the Gateway is terminated.

1. Gateway Utility Services CSC shall provide the capability for all Gateway-resident processors to perform a Recovery Dump.
2. Recovery Dumps shall be transmitted to SDC (if possible), and then logged locally.
3. Recovery Dumps shall include the following information:
 - 3.1. All variables (global and local).
 - 3.2. Route Table, Transaction Table, and Streams Table (if GCP).
 - 3.3. All loaded TCID Tables.
 - 3.4. Reason for failure (if known).

6.2.2.5 External Interfaces

1. Gateway Utility Services CSC shall track the state and performance of the active RTCN interface on the Gateway Control Processor (GCP).
2. Gateway Utility Services CSC shall track the state and performance of the Gateway Disk.
3. Gateway Utility Services CSC shall monitor and report the following statistics for the active RTCN interface:
 - 3.1. Highest number of packets transmitted in a second
 - 3.2. Highest number of bytes transmitted in a second
 - 3.3. Highest number of packets received in a second
 - 3.4. Highest number of bytes received in a second
 - 3.5. Number of errors
4. Gateway Utility Services CSC shall monitor and report the following statistics for the Gateway Disk:
 - 4.1. Use counter
 - 4.2. Error counter

6.2.2.6 Gateway Local Media

1. The Gateway Local Media shall be accessible by Ops CM for both retrievals and downloads.
2. The Gateway Local Media shall provide storage for Gateway Recovery Dumps
3. The Gateway Local Media shall provide storage for Gateway Checkpoints
4. The Gateway Local Media shall provide storage for Gateway Block Logs
5. The Gateway Local Media shall provide storage for Gateway Log Files

6.2.2.7 Gateway Message Database

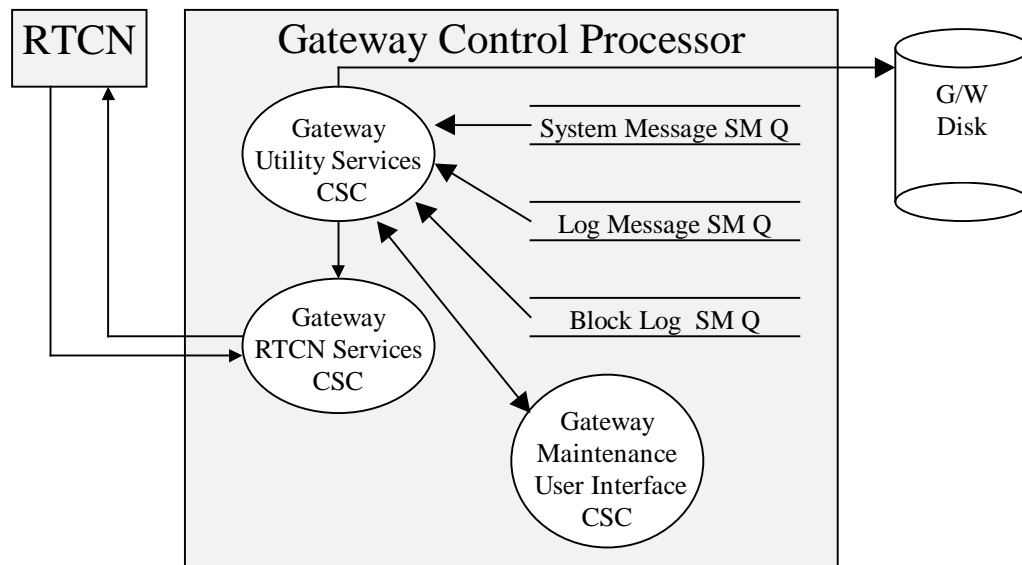
The Gateway Message Database is an "online" feature of the Gateway that is accessible using the Gateway Maintenance User Interface. It is a collection of detailed error messages that correspond to a Message ID that is displayed with each message in the Log File. The Gateway Message Database is created during Gateway software development and downloaded to the Gateway during Initialization.

1. Gateway Utility Services CSC shall provide a means of entering detailed messages into the Gateway Message Database during Gateway development.
2. The Gateway Message Database shall be stored on the Gateway disk, included in the Gateway download, and will be accessible via the Gateway Maintenance User Interface CSC.
3. Gateway Utility Services CSC shall provide a header file mapping Gateway Message IDs to the detailed message descriptions included in the database.
4. An Error that occurs on the Gateway and has a detailed description associated with it shall have its Gateway Message ID included as a parameter in the System Message generated because of the Error.

6.2.3 Gateway Utility Services CSC Performance Requirements

No performance requirements have been identified for the Gateway Utility Services CSC for the Atlas delivery.

6.2.4 Gateway Utility Services CSC Interfaces Data Flow Diagram



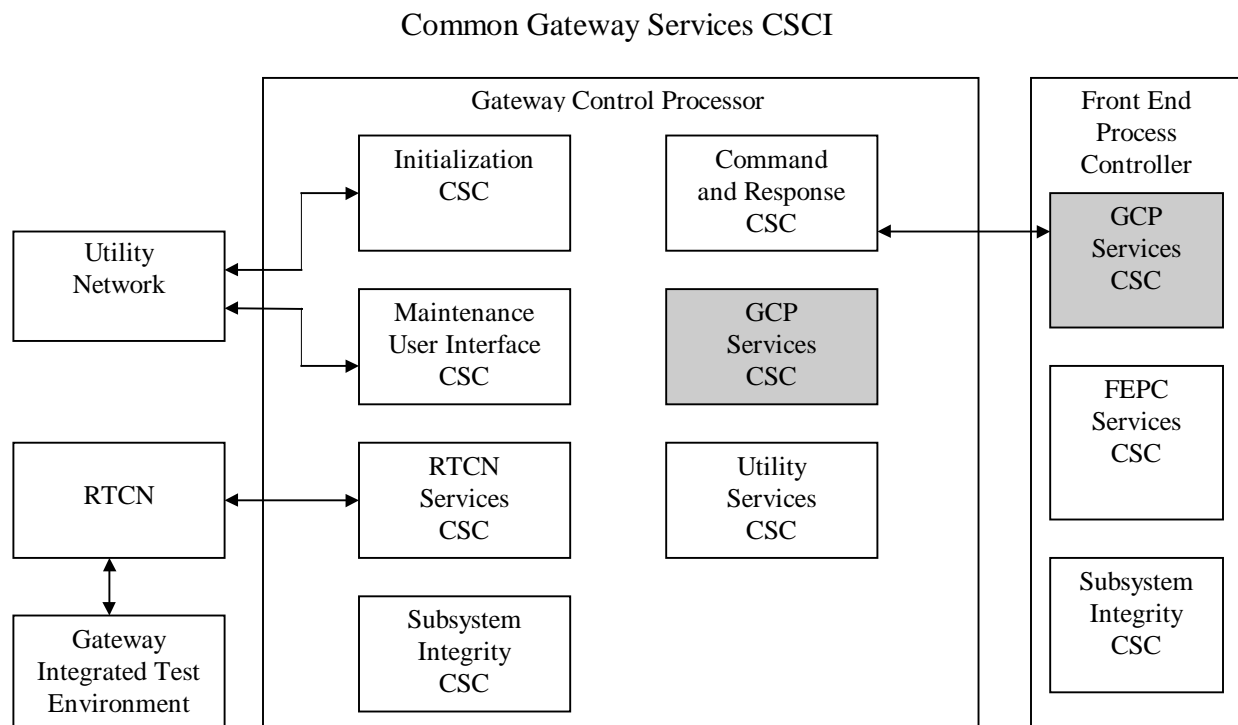
The Utility Services CSC is spawned by the Gateway Initialization CSC. The System Message, Block Log, and Log Message Shared Memory Message Queues provide every resource in the Gateway with access to those services. All Utility Services CSC services that require the RTCN are routed to the Gateway RTCN Services CSC.

7. GATEWAY GCP SERVICES CSC

7.1 GATEWAY GCP SERVICES CSC INTRODUCTION

7.1.1 Gateway GCP Services CSC Overview

The Gateway GCP Services CSC is responsible for providing a common interface from the Front End Process Controller (FEPC) to the Gateway Control Processor (GCP) and is resident on the FEPC.



7.1.2 Gateway GCP Services CSC Operational Description

This CSC provides a common interface to services provided by the GCP. These services include receiving commands from the RTCN and generating their response, sending change data or system messages, logging messages to the local hard drive or display, etc.

7.2 GATEWAY GCP SERVICES CSC SPECIFICATIONS

7.2.1 Gateway GCP Services CSC Groundrules

- None

7.2.2 Gateway GCP Services CSC Functional Requirements

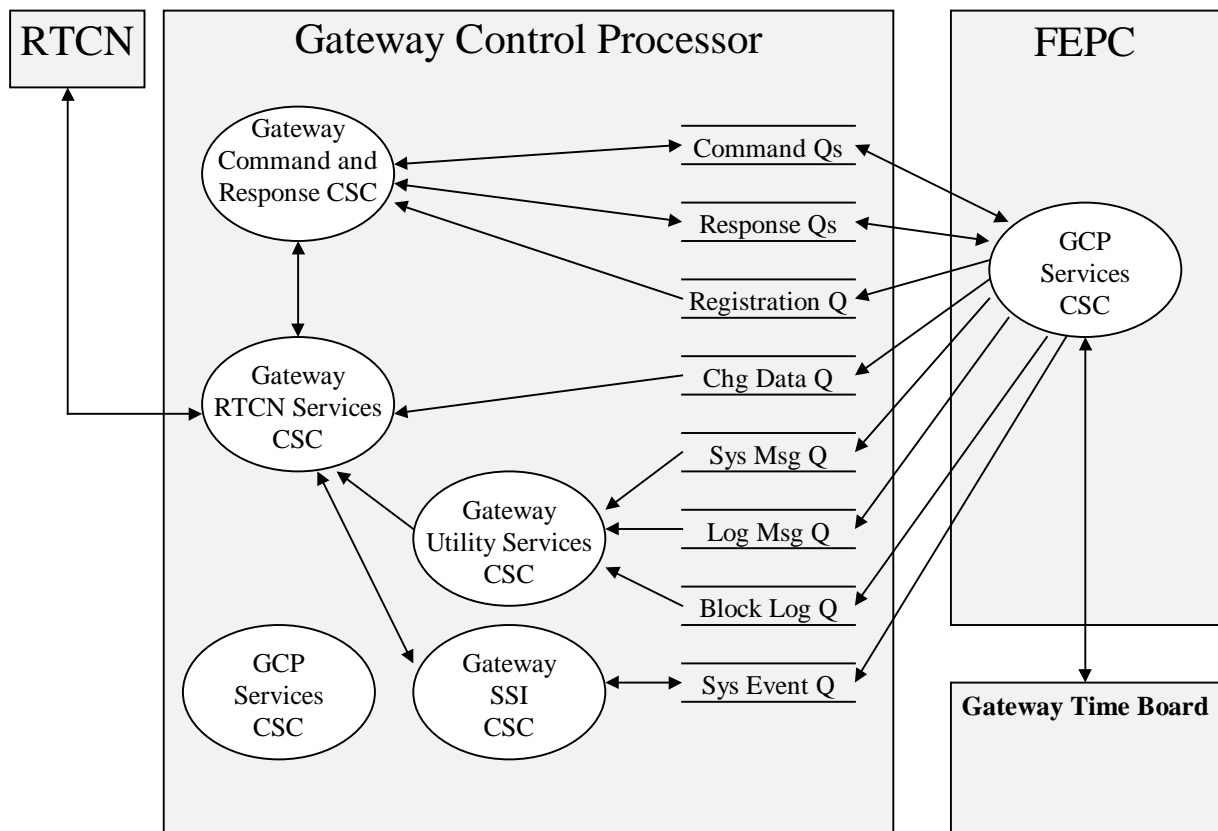
1. Gateway GCP Services CSC will provide an interface for receiving Commands from the RTCN.
2. Gateway GCP Services CSC will provide a normal and high priority queue for receiving Commands

3. Gateway GCP Services CSC will provide an interface for sending Commands to the RTCN.
4. Gateway GCP Services CSC will provide an interface for receiving Command Responses from the RTCN
5. Gateway GCP Services CSC will provide an interface for generating Command Responses to the RTCN
6. Gateway GCP Services CSC will provide an interface for sending measurement Change Data to the RTCN
7. Gateway GCP Services CSC will provide an interface for sending System Messages to the RTCN
8. Gateway GCP Services CSC will provide an interface for sending System Event Codes to the RTCN
9. Gateway GCP Services CSC will provide an interface for sending Block Logs to the RTCN
10. Gateway GCP Services CSC will provide an interface for sending log messages to the local hard drive and/or to the console port and to the RTCN.
11. Gateway GCP Services CSC will provide an interface for reading time.
12. Gateway GCP Services CSC shall provide a function to access the following:
 - 12.1. Time in BCD with microsecond resolution
 - 12.2. Millisecond Time of Day (32-bit integer)
 - 12.3. Julian Time of Year (32-bit integer)

Gateway GCP Services CSC Performance Requirements

1. Gateway GCP Services CSC will return time within 10 μ seconds from the time of a request.

7.2.3 Gateway GCP Services CSC Interfaces Data Flow Diagram



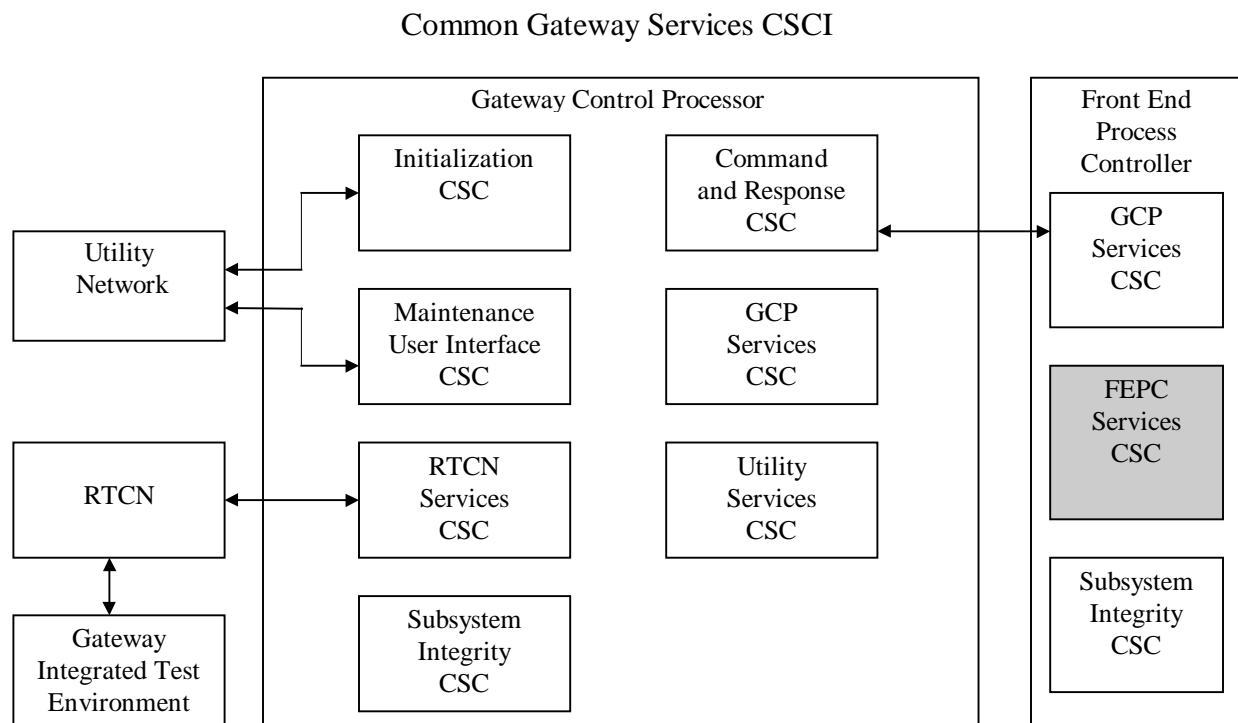
The GCP Services CSC is initialized by the Gateway Initialization CSC. After Initialization, any Gateway resident processor (including the GCP) may use the API by registering through the Registration Shared Memory Message Queue. After registering, the capability to perform Command and Response functions may be accomplished through these Queues. They provide a direct link to the Gateway Command and Response, and Gateway RTCN Services CSCs.

8. GATEWAY FEPC SERVICES CSC

8.1 GATEWAY FEPC SERVICES CSC INTRODUCTION

8.1.1 Gateway FEPC Services CSC Overview

The Gateway FEPC Services CSC is the common software services provided to the Front End Process Controller (FEPC). The common initialization functions handle all sequencing involved to transition from power-on through operational mode. Gateway specific (GSE, LDB, PCM, etc.) routines will be called as part of the table load command and activate command.



8.1.2 Gateway FEPC Services CSC Operational Description

The Gateway FEPC Services CSC is initialized at subsystem startup by the RTOS. This CSC will start an initialization command processor task. The Gateway FEPC Services CSC will then wait for an initialization command. The TCID Init command will cause a gateway specific table load command to be executed. The Activate command will cause this CSC to terminate the tasks associated with common initialization and then call a gateway specific activation function. This CSC controls the initialization mode of the FEPC during the startup and load sequence. This mode information is used by all active CSC's to determine the validity of commands.

The measurement processing aspect of the Gateway FEPC Services CSC provides software that will take an input stream of unprocessed data that has been linked to a Measurement Descriptor Table entry and convert the raw data to processed engineering unit values. The data will then be sent to the RTCN using a Gateway GCP Services API call. This CSC will also provide a set of functions to the Command CSC for all rid and request id's supported by this CSC. The functions will perform the request and send a response via an API call. This CSC also contains Common Table Load and Initialization Functions that load the Measurement Descriptor Tables into local memory. These functions are callable by each individual Gateway specific Table Load function.

8.2 GATEWAY FEPC SERVICES CSC SPECIFICATIONS

Gateway FEPC Services is organized into the following major functions:

1. Common Initialization
2. Common Command Processor
3. Common Measurement Processor
4. Common Checkpoint/Restart
5. Common Table Synchronization

8.2.1 Gateway FEPC Services CSC Groundrules

- The Gateway-specific CSCI (LDB, GSE, PCM, etc.) will provide its own Table Load, Activate, Shutdown, and Terminate functions.
- TCID tables must be downloaded to the Gateway Local Media prior to initialization.
- Conditions for state transitions and allowable actions at each state are as defined in the Gateway Initialization CSC.

8.2.2 Gateway FEPC Services CSC Functional Requirements

8.2.2.1 Common Initialization

The Common Initialization aspect of Gateway FEPC Services CSC provides the Gateway specific software a means to track the Initialization sequence of the Gateway. This sequence is common among all Gateway types. Only the Table Load and Activate functions are unique across Gateway types. The unique functions are called by this Common Initialization.

1. Gateway FEPC Services CSC shall support the System States as outlined in the Gateway Initialization CSC.
2. Gateway FEPC Services CSC shall record all initialization messages on the Gateway Local Media.
3. Gateway FEPC Services CSC shall be capable of performing Reboot, Initialize TCID, Activate, and Terminate commands on the FEPC.
4. Gateway FEPC Services CSC shall call a Gateway-specific Initialize TCID function to Initialize the TCID on the FEPC when the Initialize TCID command is forwarded from the Gateway Initialization CSC.
5. Gateway FEPC Services CSC shall call a Gateway-specific Activate function to Activate the FEPC when the Activate Gateway command is forwarded from the Gateway Initialization CSC.
6. Gateway FEPC Services CSC shall halt its Common Initialization functions upon successful completion of a Gateway Activation.
7. The Gateway FEPC Services CSC's Terminate function shall restart the Common Initialization functions if the Termination is not due to a fatal error.

8.2.2.2 Common Command Processor

1. Gateway FEPC Services CSC shall provide a Common Command Processor task that will receive and process all RTCN commands forwarded to the FEPC from the GCP.
2. Gateway FEPC Services CSC shall provide a Command registration function that allows all FEPC resources to correlate a FEPC function with an incoming command.
3. Gateway FEPC Services CSC shall call the associated registered function when a registered command is forwarded to the FEPC.

8.2.2.3 Common Measurement Processor

1. The Gateway shall convert measurements to standard IEEE-754 floating-point engineering unit form, if processing parameters for that measurement specify this conversion.
2. The Gateway shall provide the capability to convert to engineering units as specified by the conversion coefficients for each analog raw value.
3. The Gateway shall provide the capability to convert 32-bit single precision and 64-bit double precision GPC Floating point data.
4. The Gateway shall provide the capability to process digital pattern measurements composed of 2 to 64 bits.

5. The Gateway shall support the processing of parent words which contain multiple measurements by separating the parent word into measurements and processing each measurement individually.
6. The Gateway shall be capable of processing analog, digital pattern, and discrete group data types included within a parent word.
7. The Gateway shall process analog measurements based on type and/or subtype.
8. The Gateway shall provide the capability to process some or all bits of a discrete group.
9. The Gateway shall provide the capability to process some or all of a discrete group from 1 to 16 bits.
10. The Gateway shall process a group of individual data words defined as a Time Homogeneous Data Set (THDS).
11. The Gateway shall process words which make up a THDS that are not contiguous within a PCM frame.
12. The Gateway shall process all data types defined below (see SLS 82K00200 Appendix A):

<i>Type</i>	<i>CLCS Representation</i>	<i>Description</i>
AM_AU	FLOAT32	Analog Unipolar MSB left+1
AM_AB	FLOAT32	Analog Bipolar
AM_AMF	FLOAT32	Analog Measurement Filter
AM_AHU	FLOAT32	Halfword Unsigned
AM_ASM	FLOAT32	Bit String Magnitude
AM_AOS	FLOAT32	Halfword Overflow Signed
AM_TAB	FLOAT32	TACAN Bearing Word
AM_BCD	FLOAT32	Binary Coded Decimal
AM_AUK	FLOAT32	Analog Unipolar MSB left(KSC)
AM_AB2	FLOAT32	Analog Bipolar 2's complement
AM_HFS	FLOAT32	Halfword Fixed Point Overflow
AM_HMS	FLOAT32	Halfword Magnitude and Sign
AM_HXS	FLOAT32	Halfword Fixed Point and Sign
AM_HXU	FLOAT32	Halfword Fixed Point Unsigned
AMDP_AU	FLOAT64	Analog Unipolar MSB left+1
AMDP_AB	FLOAT64	Analog Bipolar
AMDP_TAC	FLOAT64	Tacan Range Word
AMDP_BMS	FLOAT64	Bit String Magnitude and Sign
AMDP_BSS	FLOAT64	Bit String Signed
AMDP_BSU	FLOAT64	Bit String Unsigned
AMDP_FXS	FLOAT64	Fullword Mixed Point Signed
AMDP_FXU	FLOAT64	Fullword Mixed Point Unsigned
DM_BD	UNSIGNED16	Binary Discrete
DPM_DEC	UNSIGNED16	Decimal Number
DPM_OCT	UNSIGNED16	Octal Number
DPM_HEX	UNSIGNED16	Hex Number
DPM_BIN	UNSIGNED16	Binary Number
DPM_BCD	UNSIGNED16	Binary Coded Decimal
DPM_BMD	UNSIGNED32	Bit String Mixed Data
DPM_CHE	UNSIGNED8	EBCDIC
DPM_CHU	UNSIGNED8	Euro ASCII
DPM_FMD	UNSIGNED32	Fullword Mixed Data
DPM_HMD	UNSIGNED16	Halfword Mixed Data
DPM_QMD	UNSIGNED8	Quarterword Mixed Data
DPM_VAR	UNSIGNED16	Variable Data
MWDP_DEC	UNSIGNED8[8]	Decimal Number
MWDP_OCT	UNSIGNED8[8]	Octal Number
MWDP_HEX	UNSIGNED8[8]	Hex Number
MWDP_BIN	UNSIGNED8[8]	Binary Number
MWDP_BMD	UNSIGNED8[8]	Bit String Mixed Data
MWDP_DMD	UNSIGNED8[8]	Doubleword Mixed Data
MWDP_EMD	UNSIGNED8[6]	Doubleword Mixed Data
FP_SPL	FLOAT64	Float Single Precision

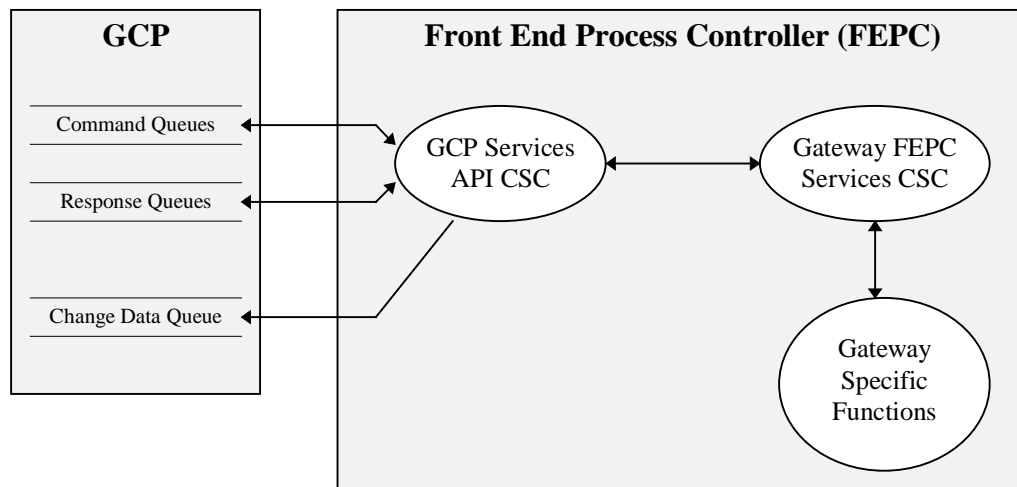
FP_HPL	FLOAT64	Float Half Precision
FP_DPL	FLOAT64	Float Double Precision
FP_EPL	FLOAT64	Float Extended Precision
FP_IEEE_SP	FLOAT32	Float IEEE Single Precision
FP_IEEE_DP	FLOAT64	Float IEEE Double Precision
FP_FPL	FLOAT64	Float Extended Precision

13. The Gateway shall maintain the current value of each measurement.
14. The Gateway shall compare each acquired measurement with the previous value of the measurement to detect a change in the measurement.
15. The Gateway shall perform change checks against unprocessed data.
16. The Gateway shall detect a change for each unprocessed measurement whenever the current sample and the previously recorded sample is different.
17. The Gateway shall provide the capability to test each discrete measurement to detect any change in data.
18. The Gateway shall send out the current value of a measurement when the first sample is acquired.
19. Gateway FEPC Services CSC shall load all required TCID tables from the local hard drive when the Initialize TCID command is received.
20. Gateway FEPC Services CSC shall respond to the Initialize TCID command with a success or fail status.
21. Gateway FEPC Services CSC shall perform the following verification checks on the loaded tables:
 - 21.1. Correct entries per record will be checked.
 - 21.2. EU coefficients which are used by the MDT shall be tested to ensure at least a first order polynomial is present.

8.2.3 Gateway FEPC Services CSC Performance Requirements

1. The Gateway FEPC Services CSC's Common Measurement Processor shall process 30,000 measurements per second.

8.2.4 Gateway FEPC Services CSC Interfaces Data Flow Diagram



The Gateway FEPC Services CSC accepts commands from the RTCN via the GCP Services CSC which is part of Common Gateway Services CSCI..

The Gateway FEPC Services CSC calls a gateway type unique table load function as part of the Initialize TCID command.

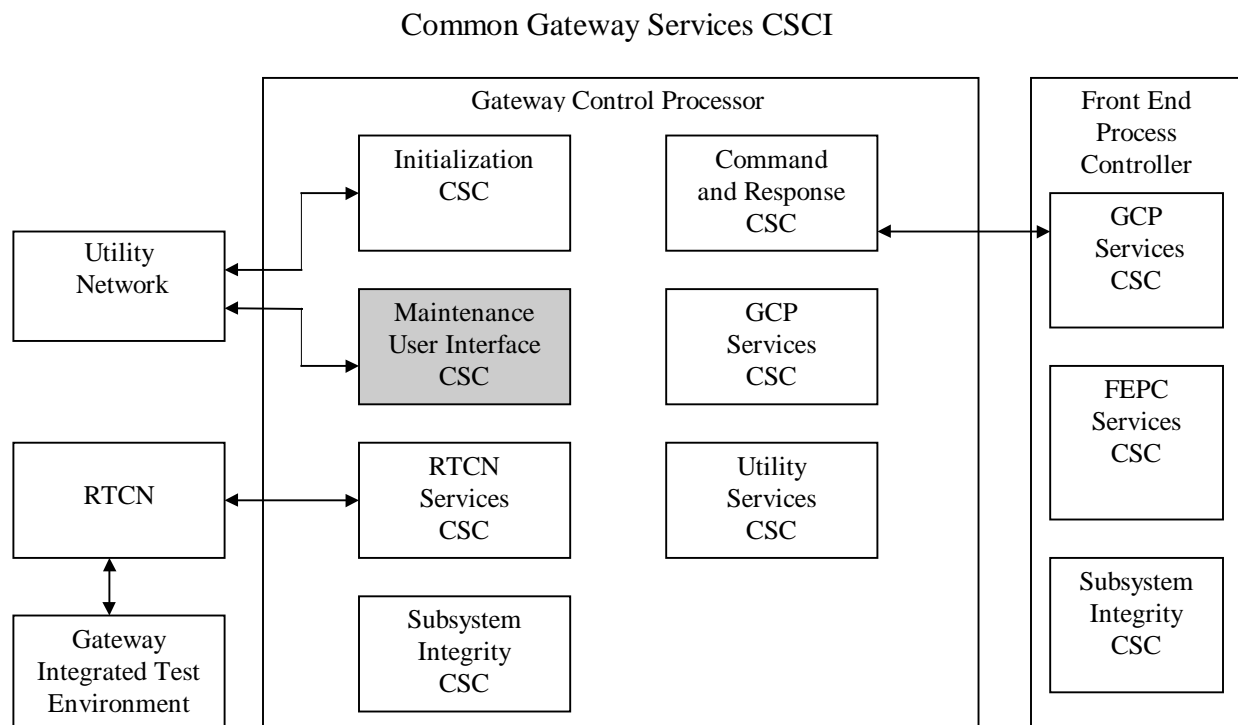
The Gateway FEPC Services CSC calls a gateway type unique activate function as part of the Activate command. The Measurement Processing CSC interfaces with a number of processes. The main interface is the incoming raw data stream that contains unprocessed data and a pointer to the MDT from the Gateway Interface CSC. The Measurement Processing CSC is spawned by the Initialization CSC. Commands to control the processing of measurements will come from the Table Maintenance Function. The Table Maintenance Function will also co-ordinate with the Measurement Processing CSC when a change to the tables is made. The Measurement Descriptor Tables are used to determine what the incoming raw data is and how to process it.

9. GATEWAY MAINTENANCE USER INTERFACE CSC

9.1 GATEWAY MAINTENANCE USER INTERFACE CSC INTRODUCTION

9.1.1 Gateway Maintenance User Interface CSC Overview

The Gateway Maintenance User Interface CSC allows access to the Gateway via the Utility Network. It is part of the Common Gateway Services CSCI and is resident in the GCP.



9.1.2 Gateway Maintenance User Interface CSC Operational Description

Gateway Maintenance User Interface CSC will allow access to the Gateway via the Utility Network in order to access several Gateway maintenance features. It will provide displays of Network statistics, Command and Data processing statistics, static tables resident on the Gateway, detailed error descriptions, and Health and Status information. The Interface will also have the capability to call a limited set of Gateway commands.

9.2 GATEWAY MAINTENANCE USER INTERFACE CSC SPECIFICATIONS

9.2.1 Gateway Maintenance User Interface CSC Groundrules

- The Gateway Maintenance User Interface CSC will not be available until the Gateway is in the (TBD) State.
- The Gateway Maintenance User Interface CSC will update live data at a rate no more frequent than once per second.
- The Gateway Maintenance User Interface CSC will use the Gateway Command and Response CSC for internal commanding.
- The Gateway Maintenance User Interface CSC will be available only over the Utility Network.

9.2.2 Gateway Maintenance User Interface CSC Functional Requirements

The Functional Requirements for the Gateway Maintenance User Interface CSC are arranged in the following major functions:

1. Initialization
2. Command and Response
3. RTCN Services
4. Timer Services
5. Subsystem Integrity
6. Utility Services

9.2.2.1 Initialization

The Initialization aspect of the Gateway Maintenance User Interface CSC is the set of the CSC's capabilities that pertains to the Gateway Initialization CSC.

1. The Gateway Maintenance User Interface CSC shall be able to display the Gateway's current System State.
2. The Gateway Maintenance User Interface CSC shall be able to display the TCIDs available on the Gateway disk.
3. The Gateway Maintenance User Interface CSC shall be able to display ASCII Tables located on the Gateway disk.

9.2.2.2 Command and Response

The Command and Response aspect of the Gateway Maintenance User Interface CSC is the set of the CSC's capabilities that pertains to the Gateway Command and Response CSC.

1. The Gateway Maintenance User Interface CSC shall be able to send a restricted set of internal commands to any Gateway-resident processor.
2. The Gateway Maintenance User Interface CSC shall restrict the (TBD) commands when the Gateway is in the (TBD) States.
3. The Gateway Maintenance User Interface CSC shall be able to track and display command and response performance statistics.

9.2.2.3 RTCN Services

The RTCN Services aspect of the Gateway Maintenance User Interface CSC is the set of the CSC's capabilities that pertains to the Gateway RTCN Services CSC.

1. The Gateway Maintenance User Interface CSC shall be able to display the Network Connections Table provided by the Gateway RTCN Services CSC.
2. The Gateway Maintenance User Interface CSC shall be able to display RTCN Network statistics for the Gateway.

9.2.2.4 Timer Services

The Timer Services aspect of the Gateway Maintenance User Interface CSC is the set of the CSC's capabilities that pertains to the Gateway's interface to the Time Board.

1. The Gateway Maintenance User Interface CSC shall be capable of displaying the current Gateway time.
2. The Gateway Maintenance User Interface CSC shall be capable of setting the Gateway's Time Of Day clock.

9.2.2.5 Subsystem Integrity

The Subsystem Integrity aspect of the Gateway Maintenance User Interface CSC is the set of the CSC's capabilities that pertains to the Gateway Subsystem Integrity CSC.

1. The Gateway Maintenance User Interface CSC shall be able to read and display all Gateway-resident processor health counts.
2. The Gateway Maintenance User Interface CSC shall be able to display the Gateway's copy of the System Configuration Table (SCT).

9.2.2.6 Utility Services

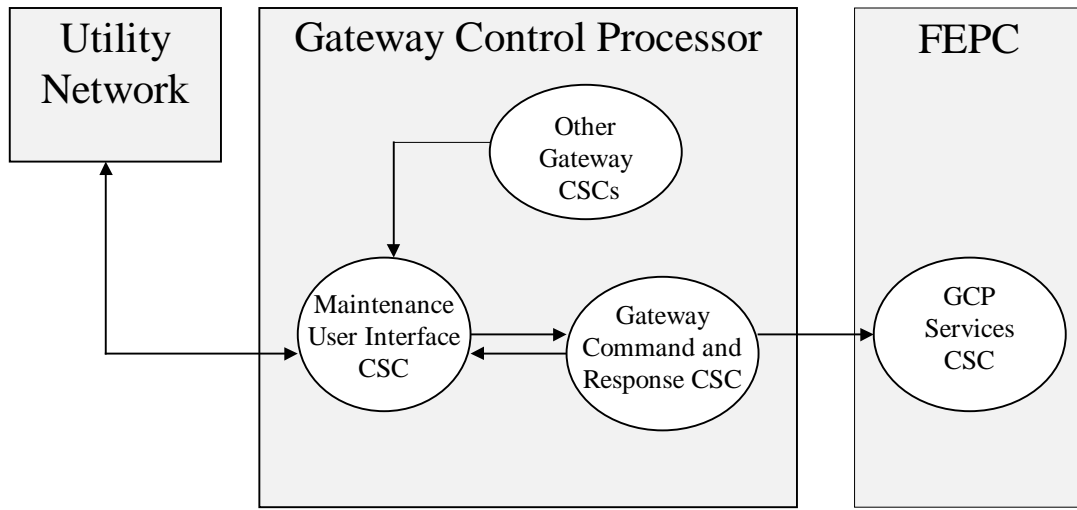
The Utility Services aspect of the Gateway Maintenance User Interface CSC is the set of the CSC's capabilities that pertains to the Gateway Utility Services CSC.

1. The Gateway Maintenance User Interface CSC shall be able to display Utility Network statistics for the Gateway.
2. The Gateway Maintenance User Interface CSC shall be able to display Shared Memory Message Queue information.
3. The Gateway Maintenance User Interface CSC shall be capable of decoding and displaying local versions of Gateway Block Logs.
4. The Gateway Maintenance User Interface CSC shall be capable of decoding the local version of a Recovery Dump provided by Gateway Utility Services CSC.
5. The Gateway Maintenance User Interface CSC shall be capable of managing a telnet session with any Gateway-resident processor.
6. The Gateway Maintenance User Interface CSC shall be capable of displaying the detailed error descriptions provided by the Gateway Utility Services CSC.

9.2.3 Gateway Maintenance User Interface CSC Performance Requirements

No performance requirements have been identified for the Gateway Maintenance User Interface CSC for the Atlas delivery.

9.2.4 Gateway Maintenance User Interface CSC Interfaces Data Flow Diagram



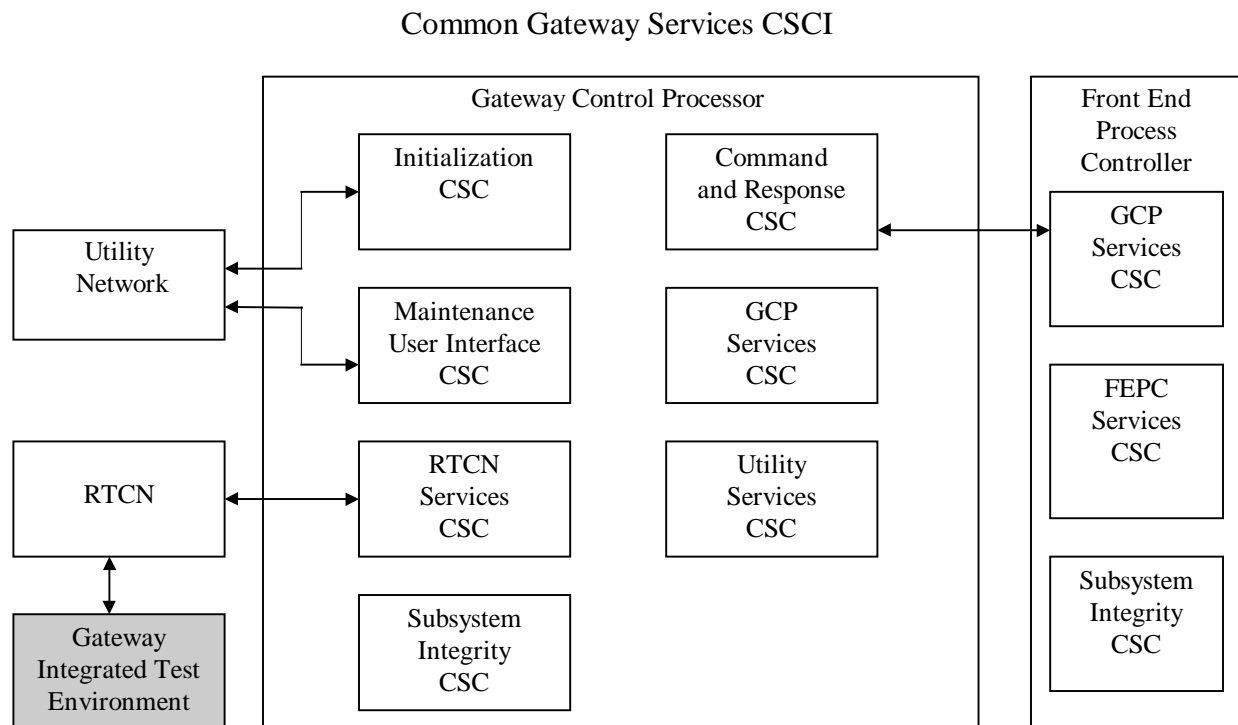
The Gateway Maintenance User Interface CSC is a server which handles client requests over the Utility Network. Requests which require commands to the FEPC are implemented using the Gateway Command and Response CSC. All other requests are handled by reading information from the other Gateway CSCs.

10. GATEWAY INTEGRATED TEST ENVIRONMENT CSC

10.1 GATEWAY INTEGRATED TEST ENVIRONMENT CSC INTRODUCTION

10.1.1 Gateway Integrated Test Environment CSC Overview

The Gateway Integrated Test Environment CSC is responsible for testing the LDB, GSE, PCM and CS Gateways. It is part of the Common Gateway Services CSCI and is and will be resident on the testing platform. The testing platform is a UNIX machine that has access to the RTCN and is capable of using Reliable Messaging.



10.1.2 Gateway Integrated Test Environment CSC Operational Description

The Gateway Integrated Test Environment CSC is a fully graphical integrated environment that will allow developers to test their Gateway systems verifying design requirements. The main GITE will consist of a RTCN Analyzer, and the Gateway Command Generator.

10.2 GATEWAY INTEGRATED TEST ENVIRONMENT CSC SPECIFICATIONS

10.2.1 Gateway Integrated Test Environment CSC Groundrules

- The GITE will support the following Gateways
 - Launch Data Bus Gateway
 - Ground Support Equipment Gateway
 - Pulse Code Modulation Gateway
 - Consolidated Systems Gateway
- All communication between the GITE and the Gateways will be via the RTCN.

- The Tool Command Language (TCL) COTS package is required to use the GITE.
- The GITE will use the Network Services CSC's API library for all RTCN software interfaces.

10.2.2 Gateway Integrated Test Environment CSC Functional Requirements

The Functional Requirements for the Gateway Integrated Test Environment CSCs are arranged in the following major/minor functions:

1. GITE Initialization and Commanding
2. GITE RTCN Analyzer
3. Function Designator Tracking Tool
4. LDB Applications Interface

10.2.2.1 GITE Initialization and Commanding

The Gateway Command Generator will send the requested commands over the CCP data stream. The user interface will list all of the available commands and attributes associated with them for command creation.

1. The GITE shall be capable of connecting to any RTCN multicast stream.
2. The GITE shall be capable of generating and responding to all Gateway Initialization commands.
3. The GITE shall be capable of asynchronously generating C-C Commands for all Gateway types.
4. The GITE shall be capable of asynchronously receiving, decoding, and displaying C-C Command Responses.
5. The GITE shall support the Command Issued completion code for C-C Command Responses.
6. The GITE shall alert the user upon reception of a Non-zero completion code.
7. The GITE shall be capable of asynchronously generating System Event Codes.

10.2.2.2 GITE RTCN Analyzer

The Change Data Analyzer will read change data packets from any Change Data Stream and display them in the GITE. The packet will be decoded so it can be easily understood.

1. The GITE shall provide the ability to read and display any RTCN multicast stream.
2. The GITE shall provide Start and Stop capabilities for reading a multicast stream.
3. The GITE shall decode the all RTCN Packet headers received from a multicast stream.
4. The GITE shall support the decoding of C-C Command body types.
5. The GITE shall support the decoding of C-C Command Response body types.
6. The GITE shall support the decoding of all Change Data body types.
7. The GITE shall support the decoding of System Message body types.
8. The GITE shall support the decoding of System Event Code body types.
9. The GITE shall support the raw dump of Block Log body types.
10. The GITE shall have the capability to clear the display for a fresh retrieval from a multicast stream.
11. The GITE shall be capable of filtering out Change Data packets with only a health counter in the packet payload.

10.2.2.3 Function Designator Tracking Tool

THE FUNCTION DESIGNATOR TRACKING TOOL WILL ALLOW DEVELOPERS TO SELECT ONE OR MANY FUNCTION DESIGNATORS AND MONITOR THEIR CURRENT VALUES AS THEY CHANGE ON THE RTCN.

1. The GITE shall track and display selected Function Designators using the RTCN Analyzer reading a Change Data stream.
2. The GITE shall support a maximum of five simultaneously tracked FD's.
3. *The GITE shall support the historical graphing of FDs (Post-Atlas).*

10.2.2.4 LDB Applications Interface

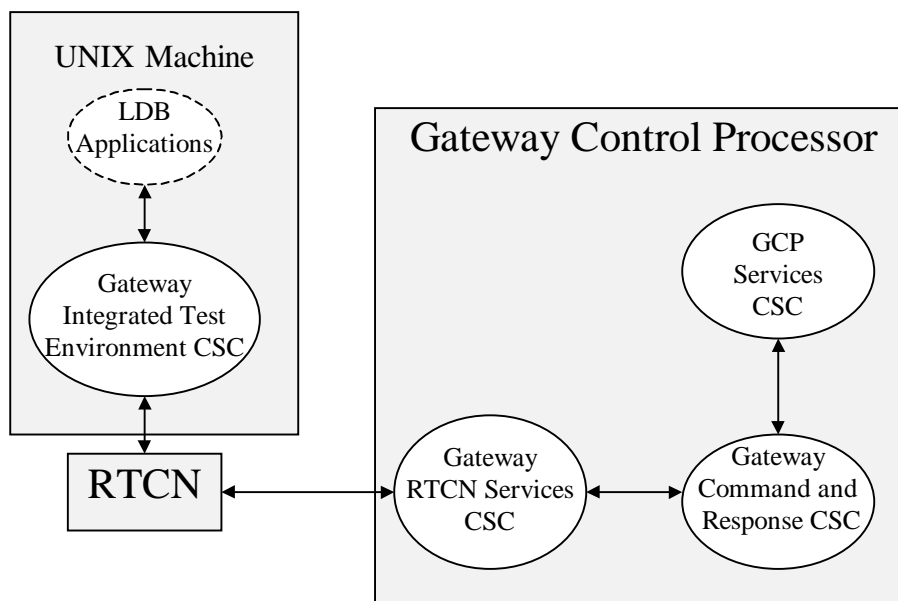
The LDB Applications Interface will be the connection to front-end applications from the GITE. Graphical LDB applications that are sending and receiving packets will be able to connect to the GITE so their command and response packets can be analyzed while still maintaining the full functionality of the application.

1. The GITE shall provide a front-end interface for applications that require the tracking of C-C Commands and C-C Command Responses.
2. LDB applications shall interface to the GITE via C procedural calls.

10.2.3 Gateway Integrated Test Environment CSC Performance Requirements

No performance requirements have been identified for the Gateway Integrated Test Environment CSC for the Atlas delivery.

10.2.4 Gateway Integrated Test Environment CSC Interfaces Data Flow Diagram



The communication to any Gateway using the GITE CSC will be over the RTCN.